

surgery

Beyond scalpel
and suture,
surgeons rely
on reflection,
mentoring, and
a penchant for
tinkering



CONTENTS

SPRING 2016 | VOLUME 89 | NUMBER 2

12

IMAGE CAPTURE:
Refining techniques to improve patients' function and appearance after surgery is essential to helping them cope with body changes.





40

Special Report: Surgery

12 Reflected Anew

Surgery leaves scars both seen and unseen. *by Stephanie Dutchen*

18 Theater Reviews

Long held to supporting roles, women surgeons are now leading and shaping the field. *by Kathryn Anderson, Christine Rohde, and Sheri Slezak*

24 Probe and Suture

Global health professionals come together to determine a path to better surgical care. *by Jake Miller*

28 Thinker, Tailor, Surgeon, Trainer

Anatomy courses allow young surgeons to gain experience and perspective. *by Bobbie Collins*

Features

32 Data Don't Lie, Do They?

When the truth of what's published is questioned, an institution's research fraud investigators may need to step in. *by Ellen Ishkanian*

38 A View of London

A vision of collaboration and scientific inquiry remains vital after forty years. *by Sharon Clark*

40 Stress Fractures

Are stories of notoriously difficult interviews for HMS applicants fact or fiction? *by Jules Dienstag*

Departments

2 From the Dean

3 Letters to the Editor

4 Pulse

HMS graduates participate in Match Day; new alliance aims to help patients with rare conditions

6 Benchmarks

Aspirin may protect against some GI cancers; timing of chemotherapy dosing could improve effectiveness

9 Bookmarks

A Doubter's Almanac
by Ethan Canin
reviewed by Elissa Ely

10 Auscultation

On Leaving Office
by Jeffrey S. Flier

31 BackStory

A physician develops novel surgical scissors—and a bone sarcoma registry. *by Susan Karcz*

46 Smart Science

Investigating neural networks
by Stephanie Dutchen

48 Five Questions

Pedro Del Nido on honing one's surgical skills *by Susan Karcz*



31

From the Dean



A FEW YEARS AGO, I had an altercation with the stone steps that lead from the Quad to Longwood Avenue. I'm not sure I should admit that they won, but I can tell you that I was left with a knee broken in multiple places—and an appointment with a surgeon. Fortunately for me, the fractures were tended to, and I set about mending and regaining my mobility.

As noted in this issue of *Harvard Medicine*, I may not have been so fortunate had I lived in a country with fewer talented orthopedic surgeons or a dearth of facilities with basic tools to ensure safe surgeries.

In his 2012 article in the *New England Journal of Medicine*, Atul Gawande '94 noted that people living in the

United States may have up to seven surgical interventions over a lifetime. Yet, as our article on the global need for surgical care indicates, nine out of ten people living in less economically advantaged nations will likely have none, given that they are altogether without access to surgical care.

Training new surgeons who will continue to fill the pipeline here and abroad is a responsibility we take seriously at HMS, as evidenced in our article on how making a surgeon requires both practice and community. Ensuring that technical innovation improves patient outcomes and the care for the whole person is also a priority, as our look at surgery and body image attests. In addition, the power that a diverse cadre of surgeons can have in advancing the profession is highlighted in essays by three of our alumnae.

This School is a fantastic incubator in each of these areas: medical education, biomedical research, and clinical practice, and for nine years I have been responsible for ensuring its position as a wellspring of progress and promise. As many of you know, I will soon be handing this responsibility to another. While I look forward to pursuing my interests in research and public policy, there are some things I will miss—like getting to introduce you to each issue of *Harvard Medicine*. I will, however, remain a reader, and, like you, will look forward to the arrival of each new issue.

A handwritten signature in black ink, reading "Jeffrey S. Flier".

Jeffrey S. Flier
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Letters to the Editor

CHART NOTES FROM OUR READERS



The photo of Warren and Lucia Prosperi's *Ether Day* painting was quite vivid and a nice reminder of the historic event that took place.

ROBERT M. FEIBEL '69
SAINT LOUIS, MISSOURI

Take Two

I enjoyed the Winter 2016 issue of *Harvard Medicine* with its articles on art and medicine. The photo of Warren and Lucia Prosperi's *Ether Day* painting was quite vivid and a nice reminder of the historic event that took place on October 16, 1846, at Massachusetts General Hospital.

I think it is worth pointing out that this painting is the second artistic rendering of that famous operation. The artist Robert C. Hinckley (1853-1941) spent some years re-imagining this same event in a large painting that he finished in 1893. His work, *The First Operation with Ether*, now hangs in the Francis A. Countway Library of Medicine.

The story of the Hinckley painting has been well documented by Richard J. Wolfe in his book *Robert C. Hinckley and the Recreation of the First Operation under Ether* (1993). The Prosperi and Hinckley paintings were compared in the 2007 article "A Tale of Two Paintings: Depictions of the First Public Demonstration of Ether Anesthesia," written by Sukumar Desai and colleagues for the journal *Anesthesiology*.

ROBERT M. FEIBEL '69
SAINT LOUIS, MISSOURI

Specialty Works

The article "A Thousand Words" in the Winter 2016 issue of *Harvard Medicine* prompts me to note that images in medicine are also important to highlighting psychiatry and psychiatric conditions. In his article in the May 2005 issue of *Archives of General Psychiatry*, James Harris discusses Pierre André Brouillet's historical painting *A Clinical Lesson at the Salpêtrière*, in which the painter re-creates French neurologist Jean-Martin Charcot's presentation about hysteria and its relationship to hypnosis. In that painting, Brouillet (1857-1914) shows Charcot demonstrating opisthotonos in a woman, Marie (Blanche) Wittman. Wittman's response, suggesting a conversion disorder, is being witnessed by a number of famous physicians; Wittman herself is being held by physician Joseph Babinski, who described the reflex. Interestingly, on the back wall in Brouillet's painting is another painting, one by medical artist Paul Richer, showing a patient with opisthotonos, presumably resulting from a tetanus infection.

Harris goes on to mention a painting by Tony Robert-Fleury (1837-1911) *Pinel Delivering*

the Insane. This painting emphasizes the message that Philippe Pinel, a French physician, espoused concerning patients with insanity: that they be afforded "liberty, equality, and brotherhood," the same rights guaranteed to citizens following the French Revolution.

KIM MASTERS '72

FAIRVIEW, NORTH CAROLINA

Long Overdue

In 1846, at the Massachusetts General Hospital, William T. G. Morton gave the first public demonstration of ether as an anesthetic, but this was not the first successful use of ether as an anesthetic. I am concerned that the latter may be what readers take away from the Winter 2016 issue of *Harvard Medicine*, given the caption that appears with the *Ether Day* painting.

The first successful use of ether as an anesthetic was performed by Crawford W. Long in a surgery he performed in Georgia in 1842, four years before Morton's demonstration. It is especially important to tell this story because the discovery of ether anesthesia is one of the greatest triumphs in the history of medicine. Long does not get the credit he deserves as the discoverer of ether as an anesthetic, and his discovery is much too important to go unrecognized.

There is another contrast between Long and Morton that is important to realize: Long wanted his discovery to be used entirely for humanitarian purposes; Morton wanted to patent ether as an anesthetic. Morton spent much of his later life fighting for money and glory. He failed in all respects.

HOWARD RUBENSTEIN '57
LA JOLLA, CALIFORNIA

Harvard Medicine welcomes letters to the editor. Please send letters by mail (Harvard Medicine, 107 Avenue Louis Pasteur, Suite 111, Boston, MA 02115); fax (617-432-0446); or email (harvardmedicine@hms.harvard.edu). Letters may be edited for length or clarity.



NEXT STEPS

HMS graduates learn where they will undertake their training

TO GRADUATING medical students, March means Match Day. At a ceremony at HMS, more than 150 students tore open envelopes, each containing the name of the institution where she or he would continue training for the next three to seven years.

Opening the event, Nancy Oriol '79, HMS dean for students, remarked on how students are generating a new future along with making advances in the use

of technology. "During the Boston Marathon tragedy, when you were trying to find your friends and your cell phones didn't work, you had the brilliant idea to connect with each other on social media ... to account for everyone.

"I believe your creativity, your judgement, and collective action are going to usher in an amazing new era," she said.

Match Day takes place each year on the third Friday of March as part of the National Resident Matching Program (NRMP), a

system for placing medical school graduates in U.S. hospitals that incorporate training positions into their facilities.

The entire residency matching process began last fall, with students registering for the match and submitting applications to programs of interest.

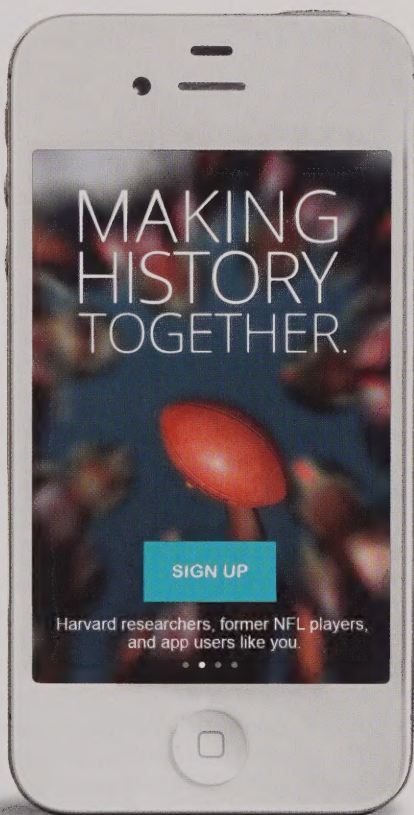
In late February, students submitted their choices and ranked them based on their desired specialty, geographic location, and, for a few, their desire to be matched with their partner, known as "the couples match."

An internationally recognized mathematical algorithm produces the final match, according to NRMP. The program first considers applicant preferences and then aligns them with each program's preferred choices.

This year, more than 27,000 medical school seniors across the country participated in the program. As for graduating HMS students, 154 matched to clinical training programs. Nine will pursue nonclinical opportunities such as research and fellowships; some of these students will enter the match program in the future.

Fifty-three percent, or 81 students, matched at an HMS-affiliated clinical program for some part of their training, internship, or residency. Forty-one percent, or 63 students, will participate in an HMS-affiliated clinical training program for their specialty. Among specialties, the greatest percentage, 28 percent, of this year's class matched into internal medicine.

—Bobbie Collins



The “I” in TeamStudy

THE FOOTBALL PLAYERS HEALTH STUDY at Harvard University, a cross-Harvard project that involves researchers at HMS and its affiliate hospitals, recently launched TeamStudy, an iPhone-based research app. Funded by the NFL Players Association and designed and tested by former players, TeamStudy focuses on health issues that matter most to those athletes, such as memory, balance, heart health, pain, and mobility.

The app allows individuals—former players as well as the general public—to enroll directly in the study, guiding them through an interactive informed-consent process. The app also allows participants to easily complete tasks and surveys directly through their iPhone.

“Traditionally, we study participants in one location, failing to capture their real-life, day-to-day experiences and activities,” says Alvaro Pascual-Leone, the HMS associate dean of clinical and translational research, an HMS professor of neurology at Beth Israel Deaconess Medical Center, and the principal investigator of TeamStudy. “Using this technology, we will be able to quickly identify patterns that could lead to treatments for health conditions faced by former NFL players.”

—Sara Silvestro

Custom Fit

Collaborative effort advances search for targeted treatments for rare conditions



A NEW ALLIANCE, driven by patients and formed by researchers, means to leverage genomic medicine and bioinformatics to better serve patients with rare or unknown conditions. The Patient-Empowered Precision Medicine Alliance comprises HMS, Boston Children’s Hospital, and other collaborating institutions, and will focus on developing tools to improve the precision of diagnoses and lead to customized drug treatments for patients.

“Thanks to the increased public availability of high-quality data sources,” says Isaac Kohane, the Marion V. Nelson Professor of Biomedical Informatics at HMS and head of the School’s Department of Biomedical Informatics, “we now have the opportunity to ‘compute’ the right drugs at a time scale and cost far below those of drug development.”

Matthew Might, an HMS visiting associate professor of biomedical informatics, leads the alliance’s pilot project. The

project team will screen for treatments for a group of subtle genetic disorders by applying a precision medicine algorithm Might developed while seeking treatments for his son, who was diagnosed with *NGLY1* deficiency, a rare syndrome.

The goal of the alliance is to develop a scalable infrastructure for delivering precision medicine at any clinic or hospital. This point-of-service delivery is meant to relieve patients of the need to navigate the health care system on their own or travel great distances to receive fragmented care.

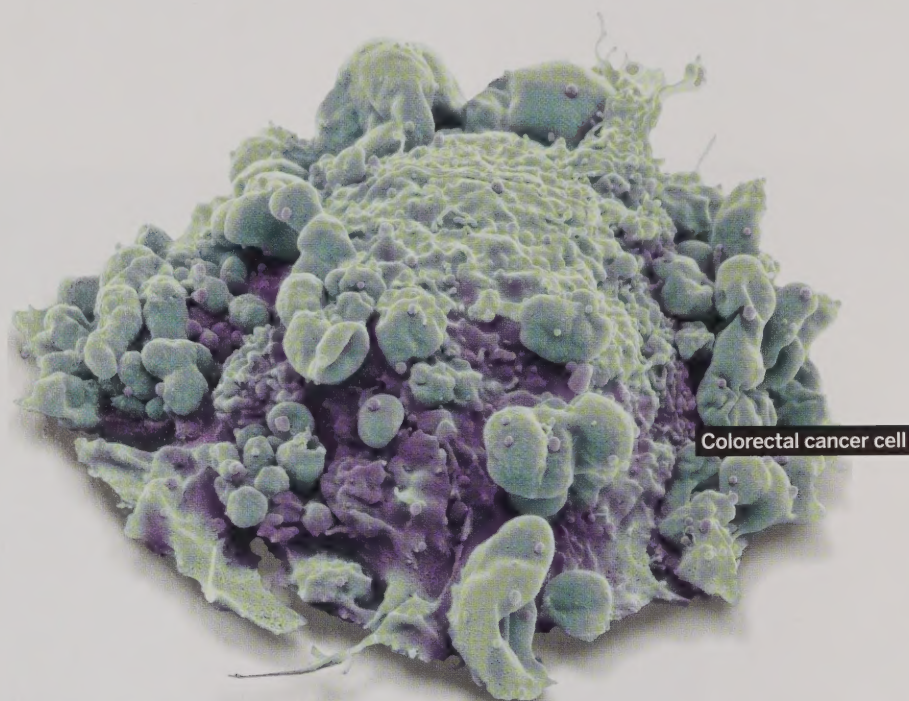
The patients’ port of entry to the alliance is a center hosted by the Department of Biomedical Informatics at HMS, one built upon the model developed for the Undiagnosed Diseases Network. The network matches experts in genome sequencing with patients who seek a formal diagnosis of their rare, or rarely encountered, disease.

Using Might’s algorithm and applying it to selected diseases, the alliance will try to match patients’ genetic disorders with existing therapies within twelve months. To achieve this, the group will use targeted screening methods that employ a patient’s own cells or unique mutations as well as novel bioinformatics algorithms that compare a patient’s data against those in pharmaceutical databases. In some cases, it may be possible to repurpose existing drugs for uncommon diseases.

—Sara Silvestro

BENCHMARKS

DISCOVERY AT HARVARD MEDICAL SCHOOL



Colorectal cancer cell

TABLET APPS

Aspirin's preventive effect may be strongest in colorectal and gastrointestinal tumors

THE REGULAR USE OF ASPIRIN significantly reduces the overall risk of cancer, according to an analysis led by HMS researchers at Massachusetts General Hospital. Their review of data from two major long-term epidemiologic studies also shows that the reduction primarily reflects a lower risk of colorectal cancer and other tumors of the gastrointestinal tract.

The findings, published online March 3 in *JAMA Oncology*, suggest that the use of aspirin may complement, but not replace, the preventive benefits of colonoscopy and other methods of cancer screening.

"We now can recommend that many individuals consider taking aspirin to reduce their risk of colorectal cancer—particularly those with other reasons for regular

aspirin use, such as heart disease prevention—but we cannot yet make a general recommendation for overall cancer prevention," says Andrew Chan '97, an HMS associate professor of medicine at Mass General and senior author of the report.

"Aspirin use may have an even greater benefit in settings in which the resources to devote to cancer screening are lacking," he adds.

A number of studies have supported regular aspirin use to prevent colorectal cancer, but aspirin's effect on overall cancer risk hasn't been clear. To investigate further, the research team analyzed data spanning thirty-two years from almost 136,000 female and male participants in the Nurses' Health Study and the Health Professionals Follow-up Study.

The scientists found that participants who reported regular aspirin use—taking either a standard or a low-dose aspirin tablet at least twice a week—had a 3 percent absolute lower risk of any type of cancer compared to those not reporting regular aspirin use. Regular aspirin use reduced the risk of colorectal cancer by 19 percent and the risk of any gastrointestinal cancer by 15 percent.

No reduction was seen in the risk of breast, prostate, or lung cancer.

Aspirin's protective benefit appeared after five years of continuous use at dosages ranging from one-half to one and one-half standard tablets a week or one low-dose tablet a day. The benefit related to other gastrointestinal tumors appeared after six years and at the same dosage level—equivalent to a daily low-dose tablet—that many people take to prevent cardiovascular disease. —Sue McGreevey

Early Returns

Progress for Medicare Shared Savings Program is slow but promising

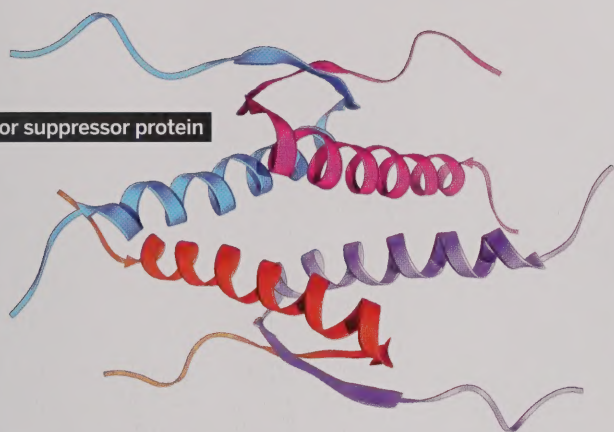
ORGANIZATIONS THAT JOINED the Medicare Shared Savings Program (MSSP) when it launched in 2012 achieved modest savings while maintaining or improving performance on measures of quality in patient care over the first full year of the program. The early adopters lowered spending by 1.4 percent in 2013, a reduction of \$238 million, relative to a control group of providers in the same geographic areas that are not accountable care organizations (ACOs).

These findings were reported online April 13 in the *New England Journal of Medicine* by HMS researchers. The study's findings give added evidence of promising early results from ACO initiatives in Medicare, but also reveal a complex story about the pattern of savings across different types and cohorts of ACOs.

Accountable care organizations are groups of health care providers that agree to provide care to a population of patients under a global budget known as a benchmark. Organizations that spend below the benchmark and perform well on quality of care measures share in the savings. Unlike with other ACO programs, MSSP participants are not required to reimburse Medicare if spending exceeds the benchmark.

While the ACOs that joined in 2012 cut spending by \$238 million, the cohort of ACOs that joined in 2013 achieved no savings in their first full year in the program, suggesting that the early success of the first participants may not be replicated by the subsequent waves of ACOs that have joined the MSSP. In addition, because Medicare paid out \$244 million in shared-savings bonuses to the early-adopting ACOs, that group's lower spending did not constitute net savings to Medicare.

"Building on the initial success of ACO models in Medicare," says J. Michael McWilliams, the Warren Alpert Associate Professor of Health Care Policy at HMS, an HMS associate professor of medicine at Brigham and Women's Hospital, and lead author of the study, "will require stronger incentives and rigorous evaluations to identify groups of systematically successful ACOs whose organizational models and strategies can be disseminated." —Katherine Igoe



Tumor suppressor protein

Time Sensitive

There may be an ideal waiting period for delivering multiple cancer drugs

AS DOCTORS AND RESEARCHERS EXPLORE the effectiveness of treating cancer patients with combinations of chemotherapy drugs, their attention has largely been focused on how much of each drug to prescribe.

Research conducted by members of the Department of Systems Biology at HMS found that achieving best results may also require looking into how much time should pass between delivering one drug and the next.

The research team had been studying how silencing MDMX, an oncogene, affected the dynamics of p53, a natural tumor suppressor, in cancer cells when they realized those same dynamics might affect the cells' sensitivity to a second chemotherapy-like treatment.

Live imaging of single cells revealed that time wildly affected cell survival. A short wait between disabling MDMX and administering chemotherapy made the two treatments synergistic, killing cancer cells more effectively than either would have alone, while a longer wait led to treatment resistance, allowing more cancer cells to withstand attack.

"This is the first time someone has shown that timing makes such a big difference in cells' response to combination therapy," says Galit Lahav, professor of systems biology at HMS and senior author of the paper, published March 11 in *Science*. "It's a first look at how one treatment can change the internal state of individual cells to make them more or less sensitive to a second treatment."

The findings indicate that testing combination treatments at only one time point, whether in lab experiments or clinical trials, may not tell the whole story.

"Right now, cancer clinical trials that use multiple drugs give them simultaneously," says Sheng-hong Chen, a postdoctoral researcher in the Lahav lab and first author of the paper. "Our work shows that you need to understand the biology at the single-cell level to determine whether timing matters and to design an optimal schedule."

—Stephanie Dutchen

DIGGING INTO THE ROOT

Mouse study suggests possibility of curbing early synapse loss in Alzheimer's

ADDITIONAL INSIGHT into how brain-cell connections, or synapses, are lost early in Alzheimer's disease has been gained from research by HMS researchers at Boston Children's Hospital. In their March 31 online report in *Science*, the scientists show that the process starts before tell-tale plaques accumulate in the brain and suggest new therapeutic targets to preserve cognitive function during the early stages of the disease.

Led by senior author Beth Stevens, an HMS assistant professor of neurology in the F.M. Kirby Neurobiology Center at Boston Children's, and first author Soyoon Hong, an HMS research fellow in neurology at Boston Children's, the researchers show in multiple mouse models of Alzheimer's that mechanisms similar to those used to prune excess synapses in the healthy developing brain become activated later in life, when they shouldn't be. By blocking these mechanisms, the researchers were able to reduce synapse loss in the mice.

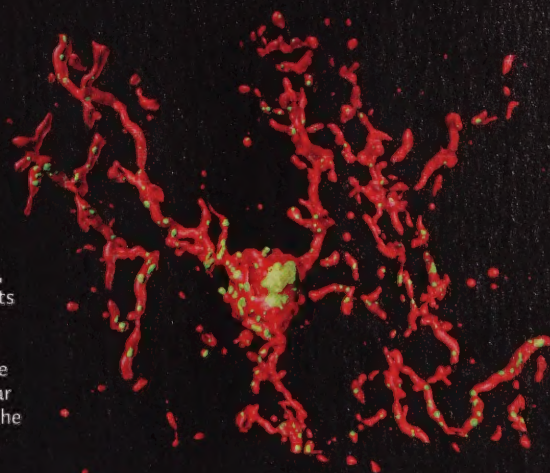
Currently, there are five FDA-approved drugs for Alzheimer's, but these boost cog-

nition only temporarily and do not address the root causes of cognitive impairment in Alzheimer's. Many drugs in development aim to eliminate amyloid plaque deposits or reduce inflammation in the brain. This study suggests, however, that Alzheimer's could be targeted much earlier, before those pathologic changes occur.

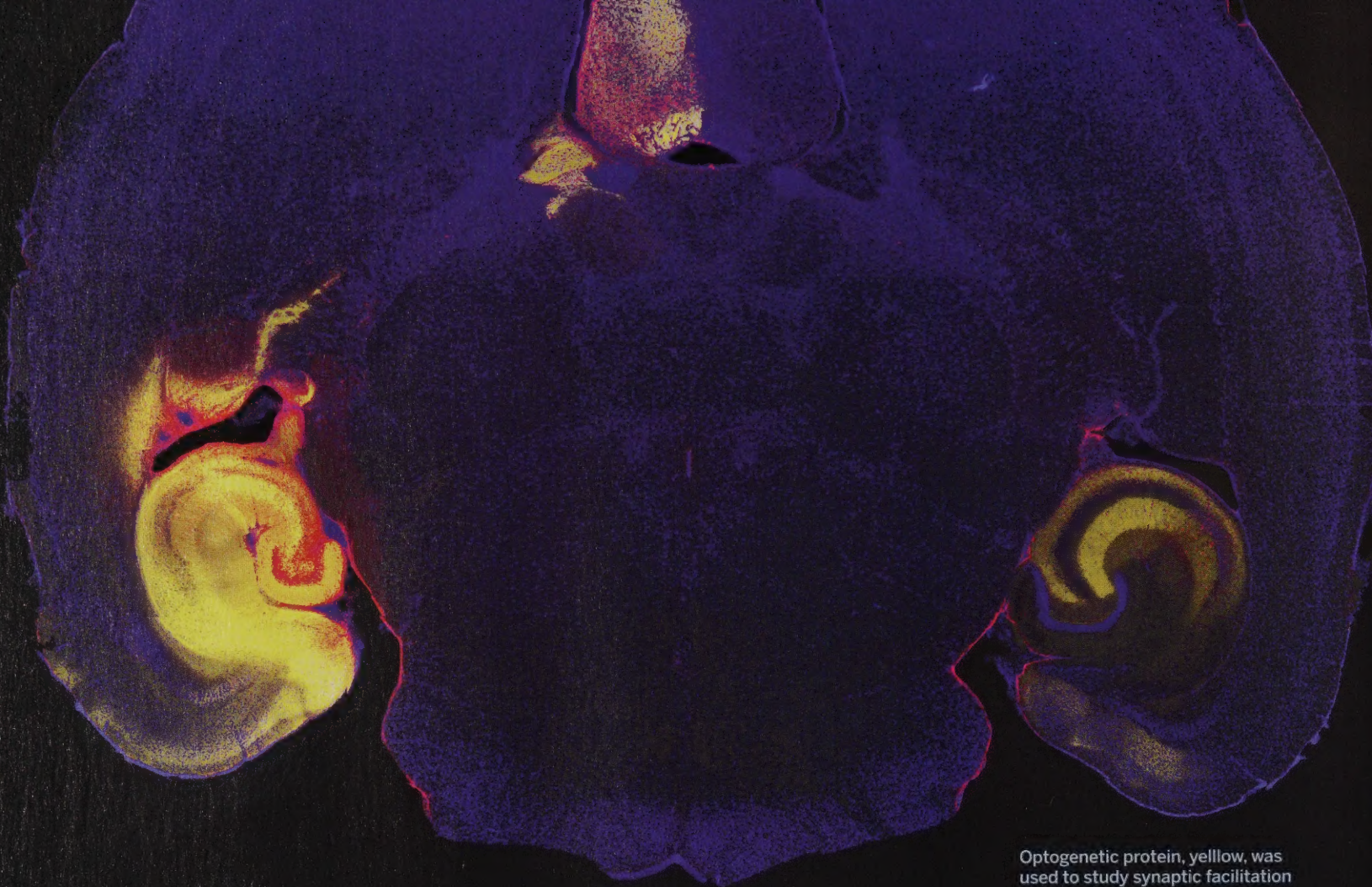
"Synapse loss is a strong correlate of cognitive decline," says Stevens, noting that such loss also occurs in frontotemporal dementia, Huntington's disease, schizophrenia, glaucoma, and other conditions.

In the mouse models, the team showed that synapse loss requires the activation of a protein called C1q, which tags synapses for elimination. Microglia, which are immune cells in the brain, then "eat" the synapses, similar to what occurs during normal brain development. In the mice, C1q became more abundant around vulnerable synapses before amyloid plaque deposits could be observed. But when the scientists blocked either C1q, a downstream protein called C3, or the C3 receptor on microglia, synapse loss did not occur.

—Nancy Fliesler



Microglia, shown in red, consumed large amounts of synaptic material, shown in green, in the brains of mice that were injected with a particular form of beta-amyloid. The mice modeled an acute form of Alzheimer's.



Optogenetic protein, yellow, was used to study synaptic facilitation

Neural Nudge

Gene discovery reveals mechanism that boosts neuron-to-neuron communication

OUR BRAINS ARE MARVELS of connectivity, packed with cells that continually communicate with one another. This communication occurs across synapses, the transit points where chemicals called neurotransmitters leap from one neuron to another, allowing us to think, to learn, and to remember.

Researchers have known that these synapses often need a boost to send information across neuronal divides. But where that boost comes from has been a mystery.

Now HMS researchers have discovered a gene that gives that boost by increasing neurotransmitter release in a phenomenon known as synaptic facilitation. They discovered this by turning on a light or two.

The gene is synaptotagmin 7 (SYT7), a calcium sensor that dynamically increases neurotransmitter release; each release serves to strengthen communication between neurons for about a second.

These swift releases are thought to be critical for the brain's ability to perform computations involved in short-term memory, spatial navigation, and sensory perception.

The team of researchers that made this discovery was led by Skyler Jackman, a postdoctoral researcher in the lab of Wade Regehr, an HMS professor of neurobiology. They reported their findings online January 6 in *Nature*.

A dozen years ago, Regehr suspected that SYT7 might drive the synaptic strengthening process. The gene turns on slowly and then ramps up in speed, which would fit gradual release of neurotransmitters.

Jackman furthered this thinking by refining the way of assessing the role of SYT7; he tested synaptic connections in brain tissue taken from mice that lacked the SYT7 gene but still had intact brain circuits, an experiment more reflective of how neurons and synapses might work in a living animal.

"The results were striking," Jackman says. "As soon as we probed these connections we found a huge deficit, a complete lack of synaptic facilitation in the knockout mice, completely different from their wild-type brothers and sisters."

To verify that SYT7 was responsible for this change, Jackman

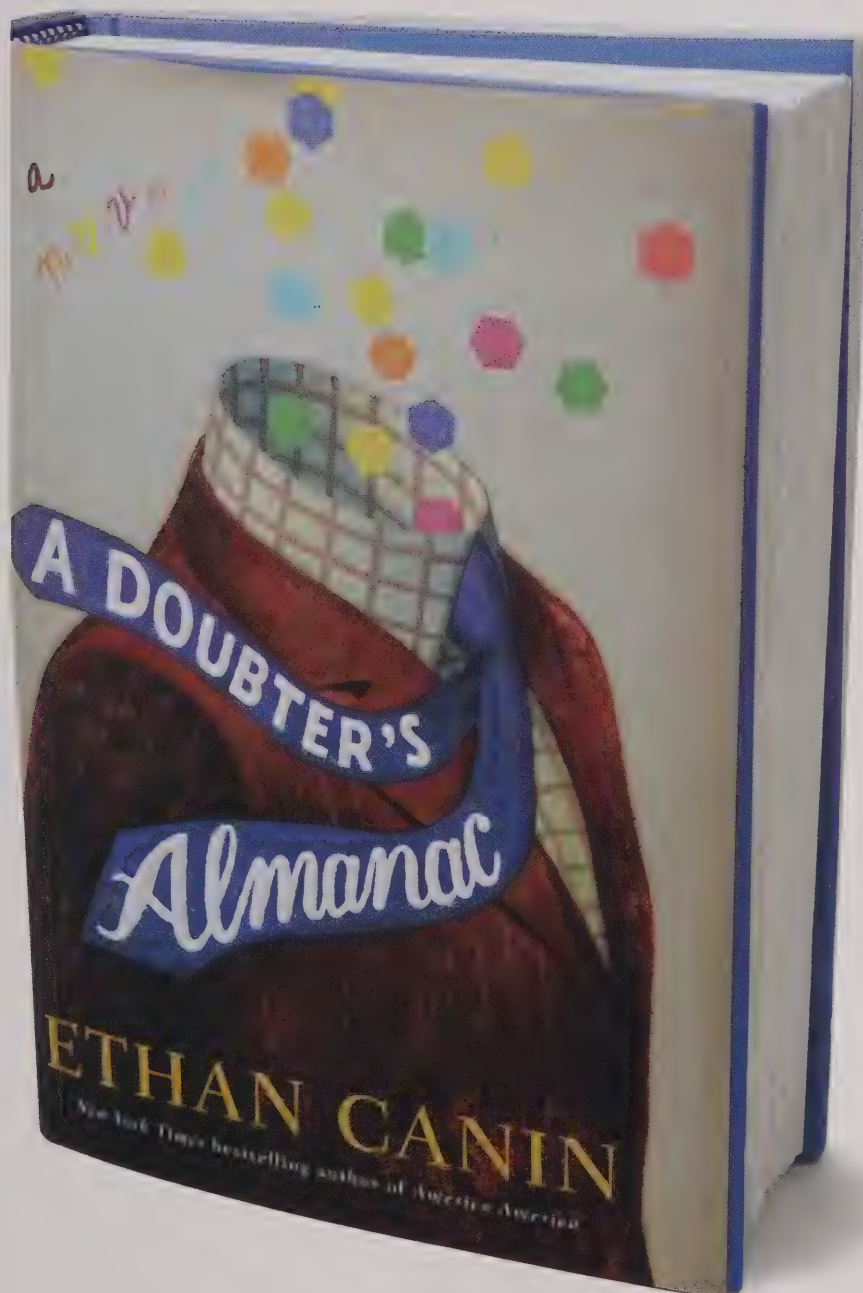
found a way to reinsert SYT7 and then restore its function on demand. He did this by using two techniques: optogenetics, a genetic manipulation tool that allows neuronal connections to be turned on and off with light; and bicistronic expression, a method that packages one optogenetic protein and one SYT7 protein into a single virus that infects all neurons equally. Using these two techniques, Jackman could selectively study what happened when SYT7 was reinserted into a neuron and measure its effects reliably.

Jackman wants to use these techniques to study subsets of neurons in different parts of the brain to see whether the gene affects fear in the amygdala, for example, or spatial navigation in the hippocampus.

—Elizabeth Cooney

BOOKMARKS

REVIEWING THE WRITTEN WORD



GENETIC CALCULUS

A Doubter's Almanac by Ethan Canin
(RANDOM HOUSE, 2016)

reviewed by Elissa Ely

IN A DEMOCRACY OF READERSHIP, such as ours, everyone gets a vote, and all have the right to disagree. In fact, we thrive on it; the sum of a passionate conversation is always greater than its arguing parts. Books are excellent fuel for these conversations, and *A Doubter's Almanac*, by Ethan Canin '88, is full of kindling.

Milo Andret begins life as a brilliant but bumbling child, then devolves into the worst sort of brilliant adult, one with a "sour, entirely analytical approach to every affair of life." His mathematical growth is so enormous that he's able to master the ineffable, and fictional, Malosz conjecture, but his human growth is so small he can neither love nor sustain responsibility for his long-suffering wife, kids, or circle of attempted-friends and colleagues.

The first half of *A Doubter's Almanac* is about meanness and injury: It's filled with bourbon, unattached sex, topology, tesseract, violently thrown objects, and evolving alcoholic cirrhosis. Milo's life is unraveling.

In the second half, however, his son Hans takes over the narration. Though not without his own problems, Hans has a gentle, more reflective way of going about life. He's a math prodigy, too, but not an academic. Turning his gifts to the derivatives market instead, he makes more than a hundred thousand lucrative orders each hour. At one point, ensnared by incentive, he worries "How could I go for a half-hour walk in Battery Park when it meant \$25,000 in income?"

Hans has a sweetness missing in his father, a computational wit (he can't help but come up with an equation to describe the tilt of his future wife's nose when they first meet), and a charm. At his wedding, he calms himself "with some Shores-Durban extrapolations." He worries about his children as his own father never worried about him. Eventually, he worries about his father in the same way. He who has been hurt is far more human for it; even Hans' writing uses parentheses within parentheses, as if doubling back doubtfully on his digressions.

Why is Milo so awful? And why is this awfulness tolerated? Why does his lovely wife stay with him, his department chair forgive him, his doctor suffer abuses while draining ascites on home visits (and then staying on to lend a hand with the gardening)?

All readers of great books know this is the cost genius exacts from itself and others. Genius is self-involved but extraordinary, which is why it must be forgiven. But here's an argumentative question: In a world full of ordinary strivers (the ones weak on their times tables but trying to make their world a bit better), is a disagreeable genius worth attention? I have one answer; you may have another. That's the beauty of a reading democracy. We get to argue about it.

Elissa Ely '87 is a Massachusetts-based psychiatrist.

AUSCULTATION

LISTENING IN ON MEDICAL EDUCATION

I have been enriched by the



On Leaving Office

Reflections on nearly a decade
as leader of Harvard Medical School
by Jeffrey S. Flier

AS I CONTEMPLATE MY TENURE AS Dean of the Faculty of Medicine at HMS—a role I began in September 2007 and from which I step down in July 2016, I am reminded of all that we have accomplished together and of the lessons I have learned about this great institution.

The nine years I have held this post certainly have passed rapidly. Although I served on the faculty of what is now Beth Israel Deaconess Medical Center for nearly three decades, and held roles of increasing scope during that period, nothing prepared me for the excitement and the responsibilities that awaited me as the School's dean.

HMS is widely considered to be the leading medical school in the United States and, possibly,

the world. Being entrusted with its leadership is an honor and a privilege and carries with it the responsibility for safeguarding that preeminent status. How to fulfill this responsibility raises many questions. But I think the key question is, Should one take a conservative path to maintaining the School's hard-earned stature, or should one pursue innovation? I have learned that success requires a constantly evolving mixture of both.

Lay of the Land

The HMS dean, who oversees an enterprise with an annual operating budget of \$700 million, is chosen by and reports to Harvard's president. The deans of the University's professional schools have limited direct interactions with the University's fiduciary governing boards. Although we strive for One Harvard—a worthy goal with some notable achievements—HMS and its sister schools function in a manner long characterized as “tubs on their own bottoms.”

HMS differs from other Harvard professional schools in several respects. First, rather than being co-located with the other Harvard schools in Cambridge or Allston, the medical school shares a geographic location on the Longwood campus with the Harvard School of Dental Medicine and the Harvard T.H. Chan School of Public Health. Second, HMS is unusual in having more than 98 percent of its faculty—almost 12,000 full and part-time members—employed by one of fifteen independent, affiliated hospitals and research institutions that together make up the Harvard medical community. HMS directly employs fewer than 200 of these faculty in its basic and social

science departments located on what is familiarly known as the Quad. So while the School's leader oversees the entire faculty of medicine, that leader's responsibility for Quad faculty is substantially greater than it is for faculty at the affiliated institutions.

HMS could not exist as a medical school, let alone the world's leading medical school, without the involvement and accomplishments of its entire faculty, who contribute to the training of our medical students and the academic reputation of the School. For HMS to remain successful, the dean must engage effectively with, and lead, the entire community. No one else can, or does, play this unifying role.

At its core, HMS advances education, research, and service. It is the dean's central responsibility to strengthen and sustain the School's leadership in each of these areas. I learned early on that there are challenges associated with coordinating within and across these efforts.

Within the sphere of education, for example, I perceived a need to improve coordination across medical education, graduate science, and continuing medical education, as well as with Harvard Health Publications, our consumer-publishing arm. I also saw the need to better integrate research efforts across the Quad and between Quad and affiliate-based faculty and programs. It was also vital to achieve greater integration between research and education. Introducing such changes within this venerable institution posed challenges that required a multiphase process for analyzing the situation with input from all constituencies, fostering collaboration among key participants, ensuring organizational

**opportunity to serve as dean and, in the process,
have learned so much about health, science, education, and service.**

and budgetary alignment, and, finally, implementing change. The ability to implement change is heavily influenced by the financial context of the institution. One year after becoming dean, the world experienced a severe financial crisis that affected economies worldwide as well as those of Harvard University and HMS. This crisis significantly altered the plans I hoped to develop as dean.

Although we had developed a strategic plan during my first year as dean, the financial crisis occurred as the plan was about to be introduced, requiring us to reduce operating expenses to tackle an unanticipated deficit. Pursuing new initiatives, and even some previously planned programs, required us to simultaneously reduce expenses and generate new revenue.

Five factors further complicated our financial situation. First, we had established a generous new financial aid plan for middle-income medical students. Second, NIH funding was stagnating. Third, HMS assumed support for the Wyss Institute for Biologically Inspired Engineering and the Department of Stem Cell and Regenerative Biology, two new cross-University initiatives. Fourth, the School assumed substantial debt financing for the New Research Building. Fifth, HMS needed to address infrastructure maintenance issues; the care of many of the School's facilities had for too long been deferred.

Acorns to Oaks

I'm proud to say that despite these obstacles, we advanced many new initiatives. In education, we created new programs, strengthened existing ones, and spurred powerful syn-

ergies. The Program in Medical Education launched a sweeping preclinical curriculum reform with revised content, a new structure, and fresh pedagogy. This new curriculum, which promotes greater exploration and depth of study, has received high initial praise from both students and faculty.

Graduate science education also was refreshed. Leaders of a new program in graduate education developed initiatives to address gaps and respond to opportunities. Among these opportunities are new tracks for therapeutics and cancer biology. In addition to invigorating the MD-PhD program, we launched several new masters programs, including programs in global health delivery, bioethics, medical education, and immunology. These programs help build faculty communities as they educate.

An effort that will have lasting impact is the new Office for External Education, which coordinates continuing medical education, Harvard Health Publications, global education, the HMX online learning program, and new programs for executive education in health and science. Created for lifelong learners of all levels worldwide, the programs will generate new revenue that will strengthen the School overall.

Harvard Catalyst has created new programs in clinical and translational research that bring faculty together in new ways. In fact, I have been thrilled with the fact that our deans of education regularly meet to explore common issues and potential synergies.

As exciting as these educational initiatives are, we are seeing equally exciting progress in research at HMS.

The Quad faculty, which welcomed twenty-eight new

members to its ranks in the past nine years, continues to achieve the highest level of bioscience discovery. We recruited outstanding new chairs for the Neurobiology, Biological Chemistry and Molecular Pharmacology, and Cell Biology departments, and launched a new Department of Biomedical Informatics and a reconfigured Department of Microbiology and Immunobiology. The Laboratory of Systems Pharmacology was created within a broader therapeutics initiative, and an enhanced Ludwig Center at Harvard Medical School for cancer biology research was brought under the HMS umbrella.

Fresh Perspectives

In a move I considered essential to maintaining the School's status as a leading research institution, we welcomed an external committee to review bioscience research on the Quad. This was an important review, the findings of which have stimulated fruitful strategic discussions that will help shape the future of our basic science enterprise.

Apart from bioscience, the Department of Global Health and Social Medicine received a new name and a new chair and initiated a new vision, while the Department of Health Care Policy continues to excel at a time when its work is increasingly necessary. The HMS Center for Primary Care, launched with a major philanthropic gift, continues to strengthen our involvement and leadership in this critical field.

The Office for Faculty Affairs has improved our promotions and appointments processes, and initiatives in faculty development and diversity are making steady progress.

Just Up the Road

Much remains to be done by my successor, who will face opportunities and challenges, expected and unexpected, similar to those I have faced. As we move forward, we must ensure that the School continues to renew and expand integrated educational efforts to retain preeminence while reaching for new audiences and opportunities. We must maintain the highest standards of bioscience and social science research while enhancing interdisciplinary collaborations in new and evolving fields of study. And we must further leverage strengths across the world-class life-science ecosystem that is Harvard medicine. With a strong management team, smart investments in new programs, support for new and established faculty, generous philanthropic backing, and effective partnerships with Harvard University, there is no doubt that HMS will continue to excel.

HMS has been my academic home, and so much more, for many decades. Through this School I have so many valued colleagues and close friends—relationships that I cherish. I have been enriched by the opportunity to serve as dean and, in the process, have learned so much about health, science, education, and service. I have, as our mission states, worked with the best people to alleviate human suffering caused by disease. After stepping down as dean, I will happily return to the ranks of HMS faculty to pursue the next phase of my career. It will be a great honor to work as your colleague and friend to advance these noble goals in new ways in the years ahead. ■

Jeffrey S. Flier is the twenty-first dean of Harvard Medical School.





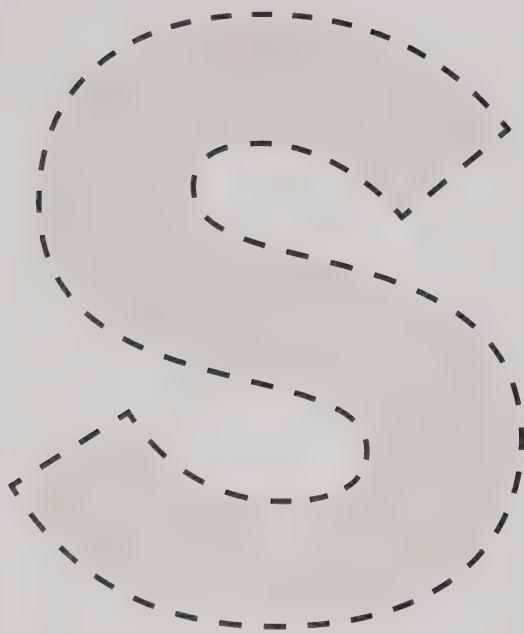
R@flected Anew

Surgery leaves scars both seen and unseen
by Stephanie Dutchen

"It's after the knives and the sutures and needles, I'm left with an arrow that points at my heart," Carly Simon sang after being diagnosed with breast cancer in 1997 and undergoing mastectomy, breast reconstruction, and chemotherapy. ■ Simon's lyrics ring true for Hester Hill Schnipper and many

Gustav Klimt
Portrait of Amalie
Zuckerkandl
(unfinished)
1917
128 x 128 cm
Oil on canvas

of the patients she sees as program manager of oncology social work at Beth Israel Deaconess Medical Center. Having lived through two rounds of breast cancer diagnosis and treatment herself, including mastectomy, Schnipper knows that in the physical and psychological wake of surgery, people may struggle with altered body image.



urgeons have gotten really good,” she says. “Scars are often smaller than they used to be or are hidden in natural skin creases so they’re almost invisible. But scars are only the obvious manifestation.”

On top of the trauma of any illness or injury that precipitates intervention, people may look and feel different after surgery. Parts of their bodies may not work as they did before. Even people who aren’t initially bothered by post-operative changes may contend with negative reactions from intimate partners or strangers. Recognizing that improved functional and cosmetic results can better preserve or restore a patient’s relationship with their body, some surgeons are driven to innovate.

“Of course you will be always and forever grateful to the surgeon who took your cancer out,” says Bohdan Pomahac, an HMS associate professor of surgery at Brigham and Women’s Hospital, who conducted the first full-face transplants in the United States. Besides that rush of gratitude, however, doctors and patients also must address “the ultimate questions, ‘How am I going to feel about my body?’ ‘What’s going to be my quality of life?’”

Barbara Smith ’83, an HMS associate professor of surgery at Massachusetts General Hospital, develops techniques in breast cancer surgery and reconstruction that are designed to help women feel more at ease with their bodies. “You can always do things better than you’re doing them right now,” she says. “You can always make things better for your patients.”

“As surgeons,” she adds, “we need to be discontent with what we know.”

Mirror’s Image

“When you look in the mirror, the woman looking back won’t be the ‘you’ you know and love,” Schnipper wrote in her 2003 patient-support book, *After Breast Cancer*. “She looks different, and everything about her body feels different.”

Studies across disciplines, procedure types, and body sites acknowledge the significant impact surgery can have on body image, especially in the early postoperative weeks. People can become depressed or anxious or develop post-traumatic stress disorder. Some can’t stand to look in a mirror or to be touched; others are distraught that they no longer fit into “normal” clothes. Schnipper remembers a woman who told her she had burst into tears when she couldn’t feel her husband’s hand on the numb skin of her reconstructed breast. Schnipper has counseled people with a new colostomy who fear they can no longer have sex or go on a date. Medical journals relate stories of patients who, after disfiguring head and neck surgery, refuse to eat or speak in public or to go outside at all.

“It’s not frivolous for someone to worry about remaining intact,” says Smith.

Researchers are still trying to gauge the prevalence of body image issues among various patient populations, standardize the measurement of such complications, and identify who is more likely to experience them.

“Many patients are well adjusted, and many are not; neither may correlate with the extent of the physical deformity,” says Pomahac, who is also director of plastic surgery transplantation at Brigham and Women’s and medical director of the hospital’s burn center.

Patients’ preoperative feelings about their bodies seem to play a role. A 2011 survey found that patients with a negative body image were more willing than those with a positive body image to accept greater surgi-

cal risk and higher cost in exchange for scarless techniques. Unrealistic patient expectations before surgery can also contribute to dissatisfaction afterward.

The personal significance of a change to a body part can depend on a number of factors: how visible the body part is, the value society places on it, and its importance to a person’s livelihood and identity. For instance, changes to sex-related organs, such as impotence after prostate surgery or menopause after a hysterectomy, can make people feel less masculine or feminine.

Major facial changes can make people less recognizable—and draw stares. Conversely, hand transplants can be more difficult for recipients themselves to get used to.

“Unlike your face, you see your hands all the time,” says Pomahac. “You may spend more time looking at them, trying to figure out how they used to look and how the new ones differ.”

Being able to choose surgery rather than having it thrust upon them can be empowering for patients at a time when they feel incredibly vulnerable, says Smith. Yet taking control doesn’t always protect against body image repercussions. As more women choose prophylactic mastectomy after surviving a first breast cancer or learning they have a genetic risk, social workers like Schnipper hear more expressions of regret. Some feel they overreacted in a time of crisis; others feel they weren’t fully informed of risks such as chronic pain.

Health care providers can’t predict patients’ responses, nor can patients predict their own. “It’s hard for most people to bring that kind of thing up,” says Schnipper, “so it would help if the surgeon would say it first. Acknowledge the patient’s fears and make those fears acceptable.”

Surgeons can also help their patients by looking for ways to improve the procedures they perform or by developing entirely new ones.



Barbara Smith

Details Make a Difference

"You're not taking my nipples."

It was 2007, and Smith's patient, a woman in her late forties, had had a successful lumpectomy to remove her breast cancer. She still faced a risk of recurrence, however, so she wanted a double mastectomy. But on her own terms.

Breast cancer surgery had come a long way in the previous decades, but in the United States, no procedure yet existed to preserve the nipple. In the 1960s and 70s, surgeons' attempts to keep the nipple alive involved leaving the underlying breast tissue intact, an approach many thought unacceptably increased the risk of cancer recurrence.

Like many of her patients, Smith wasn't satisfied with the available options. "The original nipple is very complicated in color

The personal significance of a change to a body part can depend on a number of factors: how visible the body part is, the value society places on it, and its importance to a person's livelihood and identity.

and texture and has all those little funny bumps and wrinkles," she points out, none of which tattoos or skin grafts were able to replicate.

Smith decided to apply the scientific rigor learned during her doctoral work in microbiology and molecular genetics to her analysis of nipple microanatomy. In 2006, she assembled a team that collected the more than 300 nipples removed during mastectomies at Mass General that year and took ultrathin serial sections of a subset of them. Additional tests allowed her to "discover things about the nipple nobody knew before," including the number and placement of the milk ducts and blood vessels. She then developed a technique to remove the potentially cancerous ducts while preserving about two-thirds of the blood supply, leaving



Hester Hill Schnipper

“basically bare skin” on the underside of the nipple and areola.

The following year, Smith’s determined patient became the first at Mass General to undergo nipple-sparing mastectomy with reconstruction. Since then, Smith and colleagues at the hospital have performed more than 1,800 of the procedures. She is happy that the technique enables more women to wake up with a fully reconstructed breast and enjoy greater confidence in locker rooms and comfort with intimate partners.

Now she’s focused on convincing the medical establishment that the procedure is as safe as conventional reconstruction techniques.

“In medicine, you learn the skills your mentors have perfected. But there is no way that’s the best things can be,” she says. “You always have to look at what you do with a fresh eye, questioning the technique, taking a different perspective.”

The Way You Wear Your Hat

Pomahac spent years in the Brigham and Women’s burn care unit saving lives and trying to reconstruct disfigurements. But there were some things surgery couldn’t do, like rescue the face of 55-year-old Jim Maki, who in 2005 fell onto the third rail at a Boston subway station. Although Pomahac eventually managed to stabilize his patient, Maki lost his nose, cheeks, lips, upper teeth, and palate.

Living without a face puts drastic restrictions on people’s lives. In addition to becoming unrecognizable to their loved ones, Pomahac says. “They can’t breathe, can’t speak properly, can’t eat in public. Many of them have gone blind.”

Pomahac set out to develop a face transplantation protocol that could help Maki and others like him. He and a colleague flew to Belgium to prepare for the operation and discuss ideas with the team of surgeons that had conducted the world’s first face transplant. In 2009, he led the team that performed the hospital’s first partial face transplant—on James Maki—followed by three full-face transplants in 2011.

As a reconstructive surgeon, Pomahac is able to help patients who have already suffered severe trauma regain a look that approaches normal. Still, he “paints the picture pretty black” during preoperative consultations, emphasizing the uncertain return of sensory and motor function and the risks and limitations of lifelong immunosuppression. He believes this approach helps explain why candidates who go forward with transplantation accept their new faces with surprising ease.

Bohdan Pomahac



Yet given how much human individuality is linked to facial features and expression, how is it that patients do not experience an identity crisis after surgery?

Facial transplant recipients don’t look the same as they did before their accidents—and they don’t look like their donors, either, since the skin and muscle are draped over different bone contours.

“You one day see a patient who looks completely different from the previous day, yet it’s remarkably easy to identify them,” says Pomahac. The underlying structures of the face are the same, as are the ears, and, sometimes, the hair. Often, patients search for a feature in the donor face—a hooked nose, a dimpled chin—that reminds them of what they used to look like. Then, says Pomahac, “there are all these clues, how they talk, how they think, their body language, and suddenly it all clicks in, and it’s like, yeah, it’s the same guy.”

Cutting Edge

Although they are mainly driven by patient needs, Pomahac and Smith also enjoy the novelty and challenge of devising new techniques.

“Most progress in surgery these days is made by new technology or medications,” says Pomahac. “There aren’t many opportu-

nities to come up with a new operation. It’s kind of old-fashioned.”

Surgical innovation is one manifestation of Pomahac’s lifelong passion for solving problems. At age 15, he competed in the Czech Republic’s national men’s chess league, a game he set aside in favor of medical school.

“I think plastic surgery attracts people who are creative and who love the fact that every problem has five different solutions,” he says. “That’s what I get excited about. You’re constantly inventing things and constantly questioning.”

Smith, who was raised in a medical family in a small town, feels a deep-seated duty to help those around her. But it’s also fun, she says. “As you move along in your career, every time you get to figure out a whole new way of doing things, it’s really invigorating.”

Along with the pleasure of discovery is the hope that innovations will help patients move beyond survival and focus on enjoying the life that surgery has helped make possible.

It is, says Schnipper, the satisfaction that comes when a person can say, “This is who I am now.” ■

Stephanie Dutchen is a science writer in the HMS Office of Communications and External Relations.



Theater Reviews

Long held to supporting roles, women surgeons are now leading and shaping the field

According to Preeti John, a Baltimore-based surgeon who gathered essays, poems, and interviews from sixty women surgeons for her book, *Being a Woman Surgeon*, a surgeon's life is challenging, requiring not only physical stamina but also "strength of character, balance, careful planning, and a firm commitment to what is important." These adapted essays from three of the surgeons featured in the book, each a graduate of HMS, calmly and proudly attest to the truth of her statement.

Musings of an Accidental Pioneer

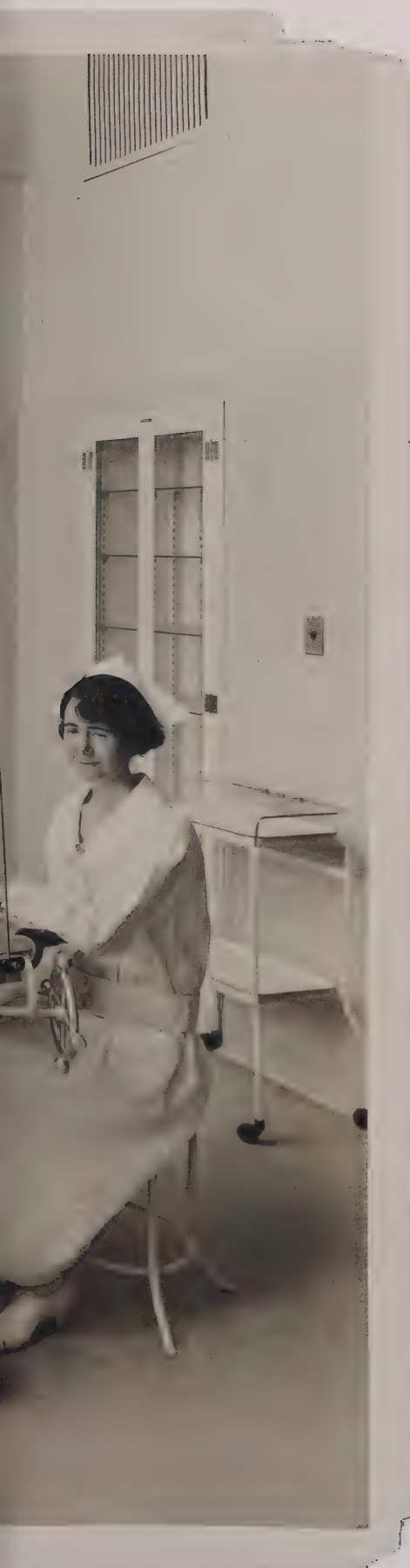
BY KATHRYN ANDERSON

I THINK THAT I BEGAN MY ROAD to being a surgeon at the age of six, right after World War II, when my aunt took me and my sister to the newly reopened Manchester Art Gallery. I gazed at a pencil drawing of *Theatre* by Barbara Hepworth, who is better known as a brilliant sculptor. It depicts an operating room with a table surrounded by mostly men and one woman, undoubtedly a nurse. Nothing changed my mind, although being a woman surgical resident in the 1960s almost destroyed my resolve.

No one in Boston would give me a surgical internship, so I became a pediatric intern at the Children's Hospital and entered surgery at the residency level at Georgetown. There, getting through the next rotation occupied all my time and energy. Children remained

my first love, and I became a pediatric surgeon, one of the first to take the new pediatric surgery board certification exam.

I began my medical training at the University of Cambridge in England and met my American husband there. I had not wanted to go to Cambridge, as Oxford and Cambridge added a year to the training. Most English universities train physicians in five years, right after high school, with no degree until the medical one. Cambridge gave a bachelor degree halfway through medical school, hence the extra year (there were three preclinical and three clinical years). However, fate intervened. The night before my final exams in high school (the "A" levels, without which I could not get into any university or receive a much-needed scholarship), I came down with appendicitis. I missed the exams and had to stay an extra year in high school; the exams were only given once a year. So I took the Cambridge entrance exams for something to do.



In the 1960s, it was very much okay to make sexist remarks and be overtly averse to training a woman.

Although there was no formal arrangement between the universities of Cambridge and Harvard, they were “kindred souls,” believing that each was the best university in the world. It was difficult to get into Cambridge, particularly from a state high school rather than a private school, but I passed the entrance exam, and they must have liked me. I was only the second in my high school to be admitted there. My husband was already scheduled to enter Harvard Medical School at the second-year level after his two years in Cambridge, so it was relatively easy to follow him a year later. I finished the last three years at Harvard. Once I finished the second year, a nonclinical year, and started to learn clinical medicine, I did not look back.

However, I did run into overt sexism when I told the dean of students that I wanted to do a surgical internship and residency. I was told that women could not be surgeons, and if I even applied, the dean would make sure I did not get any internship in Boston or elsewhere. So I did a year in pediatrics at the Boston Children’s Hospital, a year I very much enjoyed and have never regretted. Said dean obviously forgot his remarks and could never understand why I would never speak to him again.

Residency: oh dear! In the 1960s, it was very much okay to make sexist remarks and be overtly averse to training a woman (“You’ll only get pregnant and quit, wasting a place which could be better occupied by a man.”). There were a few notable exceptions of surgeons, mostly in the community hospitals I rotated to, rather than the university, who were willing to train me. Once I reached my third year of residency, I was good enough that the surgeons fought to get me to assist them and I did more than 600 cases in that one year, having previously done a total of six cases the prior two years. This included resection of an abdominal aortic aneurysm.

Mostly, my fellow residents, who were of course men, were supportive. A minority who resented it when I was given cases they wanted to do undermined me at every opportunity. I was only the third woman to go through the Georgetown residency. By the time I finished as chief resident, a total of five, including myself, were in the program. There were no support systems, only the sporadic support of individual surgeons, and, for me, a constant—my husband, who was an unending source of comfort and encouragement.

Kathryn Anderson

Nurses were marvelous. And there was never a problem with patients; they were only too happy to have attention paid to them, and I was a fairly good listener. I have always had the policy of treating the whole family, whether in my pediatric practice or when I was training in adult surgery, and this worked well for me as well as for the patients.

I would like to say that things have improved, and it is now common for women surgeons to combine a successful career with bringing up children. We chose not to have children for a number of reasons, and although I have no personal regrets, I applaud women who are able to manage career and family with all the difficult choices inherent in “having it all.” This is not to say that the playing field is completely level as yet; there is still some way to go. But the time for stridency is gone. It is entirely possible that integration will occur to such an extent that there will be no need to be distinctive as a woman surgeon—just as a surgeon.

Grateful patients always claim their doctor saved their life. In fact it is quite rare to really cheat death on someone else's behalf. But when it happens it is the most moving experience. For me, one of those rare privileges was when my grandnephew was born with a heart murmur. The neonatologist assured my nephew that the baby could go home, as the defect would close by itself. In the dim recesses of my brain I remembered that a VSD (ventricular septal defect) most often did not present with a murmur at birth. On my advice my nephew insisted that the baby have an echocardiogram; he had critical aortic stenosis, which most certainly would have resulted in early death if he had been forced to go home. My grandnephew is now a lusty lad, who has no idea of the role I have played in his life, nor that he was the inspiration for me to finally write a book that had been in my head for decades. *Who Will Hold My Hand?* is for parents whose children need surgery, and it is published by the American College of Surgeons.

How have I managed my complicated life? I pass my philosophy on to readers: You walk one step at a time, so you must achieve milestones one at a time, whatever your role in life turns out to be.

Kathryn Anderson '64 is a retired pediatric surgeon, formerly affiliated with Children's Hospital Los Angeles, where she was the first woman surgeon in chief. Anderson also was the first woman president of the American College of Surgeons.

“Surgimom”

BY CHRISTINE ROHDE



I HOLD THE BEAD BRACELET IN MY HAND, rubbing the pink and purple sparkly globes and the M-O-M blocks like a sacred rosary. I am about to head into another twelve-hour operation and yet another day without seeing my kids. My daughter proudly gave me her bead creation, and I proudly wear it at work, tucking it into my coat pocket when I head to the OR. All thoughts of the challenges and rewards of my chosen profession are tucked away at that instant as well. My patient and a successful outcome to her cancer reconstruction surgery are my only priority. And that is how it should be, for everyone going “under the knife” should be assured of the commitment of the person whom he or she trusts to cut, to sew, to repair, to heal. And to know that that commitment exists whether it is day or night, weekend or holiday.

Women in surgery have unique gifts to offer but unique sacrifices to make as well. As I go through my career, every year moving faster than the last, I realize that, although I knew how hard it might be, I never knew how fulfilling it could be. I thought I would be a surgeon even when I had no idea what that meant. My mom saved my elementary-school writing—oversized letters on thin paper with wide lines—“I want to be a doctor someday, maybe a brain surgeon.” I still don't know where I got that idea. No one in my family is a doctor, let alone a surgeon. Maybe it was just because it seemed like the hardest thing to do. I barely wavered in my path to medical school. Once there, I realized that nothing appealed to me like surgery. I usually advise students that, if there is anything they would like to do in medicine besides surgery, they should probably do that. But for me, there was nothing else.

So I went on to general surgery residency, which, come to think of it, is a lot like delivering a baby: 120-hour work weeks and sixty-hour power weekends, pre-rounding at 3:00 a.m., passing people coming home from a night out. If I try hard, I can remember some of those tough times, but mostly I remember being part of a team; wanting to be nowhere else; learning to be at my best at all times of day or night, no matter how little sleep I'd had; and the overall sense of accomplishment. So, like childbirth, I don't remember the pain; I only appreciate the good that came out of it.

I never really thought about having a family, other than my family of surgical residents. I did manage to sing in one opera during residency, playing Zerlina in Mozart's *Don Giovanni*. Several of my surgical mentors came to the performance, and it was wonderful to see them in another context.

I got married during residency but waited until after finishing plastic surgery residency to have children. There is, of course, no right time for a female surgeon to have kids. I remember hearing the regret of some surgeons who said they waited too long and were never able to have children. I also remember how hard it was for already-overstretched residents to cover for fellow residents if the need ever arose.

Now, years later, I realize that balance is not possible. It is possible to be a great mom and a great surgeon, a great wife, and a great researcher. But balance is not possible. One day, the scale will be tipped more on one side; the next day, it will tip the other way. You can end up feeling off balance and torn.

I am only able to do what I do because of a supportive spouse and family. My husband works as hard as I do, both at work and at home. My mother, who helps with my children, thinks of it as her contribution to my patients, to enable me to work early and stay late. In this regard, we are the same as our male colleagues with families. It is only with the support of others that we can do what we do. (However, I doubt that most of my male colleagues worry about packing school lunches or cleaning toilets when they get home.)

What are the challenges? Being torn between work life and home life. Feeling like I could always do more in one place or the other. The drive to work harder than everyone else, so that no one can ever complain about female surgeons.

And the rewards? The hugs I get from patients. The tears of gratitude. The knowledge that at the end of the day (even if that is the middle of the night) someone has been positively affected by my hard work. I don't have to wait for a medication to kick in or a laboratory test to come back—I see it at the end of an operation done well.

What's more, I get to go home to the rewards of kids running around yelling "Mommy's home," or a sleepy, soft, post-bedtime kiss.

Mommy's home. And I get to do it all again tomorrow.

Christine Rohde '99 is an assistant professor of clinical surgery at Columbia University.





Woman Surgeon— From Boston to Baltimore

BY SHERI SLEZAK

I FIRST FELL IN LOVE WITH ANATOMY when we dissected a mink in seventh-grade science. Most kids liked the fur. I liked the heart and the intestines. The next thing I knew, I was in Harvard Medical School.

At Harvard, 30 percent of my class was female—a great feat in 1980. I did surgery as my first clinical rotation to get it out of the way, because I definitely didn't want to be a surgeon. But who knew that it would be so much fun to do a physical exam on someone, then cut them open to see if you were right? Anatomy really is beautiful. The only role models in surgery were a woman cardiac surgery resident who packed a gun in a shoulder holster, and a pediatric surgery resident who consistently managed to alienate people every time she uttered a sentence. Considering this, it was pretty worrisome to want to go into surgery. A rotation in plastic surgery with Joseph Murray '43 taught me that you can be humble and kind and still be a surgeon.

I did general surgery residency training at Columbia Presbyterian. I was the only female in my intern group of twelve, but there were four women residents in general surgery and orthopedics. We had informal "girls' surgical service" dinners and supported each other. I was the fifth woman to finish general surgery. Columbia is a great teaching institution.

I interviewed for a plastic surgery residency at Johns Hopkins Hospital. There, they told me about previous women who had left, told me that I could never have babies in their program, and that they had never had a good woman resident. During the interview session,

One of the general surgeons there was often heard to proclaim that "Women do not belong in surgery." It was like going back in time fifty years—or maybe a hundred. Nevertheless, I signed on. You can learn anywhere, I told myself.

ELI MEIR KAPLAN

I was sent to lunch with the chair's secretary. One of the general surgeons there was often heard to proclaim that "Women do not belong in surgery." It was like going back in time fifty years—or maybe a hundred. Nevertheless, I needed to be in Baltimore, so I signed on. You can learn anywhere, I told myself.

I had my first child in my research year. I told my chair about a cute thing that my child did, and he looked at me and said, "I hate babies." So he missed out on all the stories about my brilliant infant.

After nine years of training, I took a job as attending plastic surgeon at the University of Maryland and have been here twenty-five years. I had my second child at the age of forty. I asked the Maryland chair of surgery about the maternity policy and he said he would have to get back to me. He called in a week and asked what I wanted it to be. I was surprised that they did not have to close the hospital while I was away for six weeks of maternity leave, but everything seemed to run well without me—a good lesson for me!

My third child was born when I was forty-two years old. It was always a dilemma how to position myself in relation to the OR table: Did I place my ever-expanding belly below it or above, so I could rest the baby on it? I learned that sitting down occasionally during surgery helped my legs a great deal. Ralph Millard always said, "Why stand when you can sit while operating?"

I eventually became a full professor and chair of plastic surgery. Now that I am chair, I can tell you that men ask for a higher salary and a promotion every other month.

We recently had a picture taken of twenty-three women surgeons at the University of Maryland, and many have had children. I am enthusiastic when my faculty members are pregnant. It all works out.

I am proud to be a surgeon. I learn every day from my patients, but my proudest moments are still as a mother of three. ■

Sheri Slezak '80 is a professor of surgery at the University of Maryland Medical Center.

Essays are adapted from Being a Woman Surgeon: Sixty Women Share Their Stories, edited by Preeti R. John, with permission from the publisher, Gordian Knot Books/Richard Altschuler & Associates, Inc., Los Angeles, California (www.richardaltschuler.com). The full essays, plus one by Susan Pories, an HMS associate professor of surgery, are online at magazine.hms.harvard.edu.



Probe



Global health professionals come together to determine a path to better surgical care by Jake Miller

and Suture

It doesn't take long to break a leg. It can happen in an instant and in many different ways: a traffic accident, a workplace misstep, or a slip on the way home from school. But what happens afterward differs greatly depending on where you are. ■ In most parts of the United States, the injured leg would be repaired surgically using well-established orthopedic procedures that have been developed to help restore the limb's normal functioning, and medications would be administered to stave off the risk of infection from either the injury or the surgery.

For any of the five billion people globally who don't have access to safe, affordable surgical care, the story could have a different ending: disability, impoverishment, or even death from infection.

Although surgery is an integral part of health care in industrialized countries, research from a report by the *Lancet* Commission on Global Surgery, an international group that seeks to improve the quality of and access to surgical care around the world, reveals that nine out of ten people living in many low- and lower-middle-income countries simply do not have access to surgical care. In addition, the report estimates that the worldwide human and economic costs of poor to no access to surgical care could reach slightly more than U.S. \$12 trillion in the next five years.

This situation, say many in the global health community, may result from the fact that for too long surgical care has been considered too costly to be on the list of must-do improvements to the delivery of health care.

There is, however, a growing chorus calling for change. New collaborative working models are finding unexpected ways to deliver care, while the work of entities such as the *Lancet* Commission are providing data to help propel that change. And many of the individuals leading the drive for study and change are surgeons and researchers from HMS.

Tundra to Tropics

The Gundrum family from Wisconsin anticipated difficulties even before their son Dominic was born. Ultrasounds revealed a rare, severe facial cleft and, from his forehead, an encephalocele, a protrusion of the brain and its membrane. Searching for ways to help their son, they came across the story of a Haitian boy named Dumanel born with a similar condition. Dumanel, they learned, had received help from HMS surgeon, and co-chair of the *Lancet* Commission, John Meara.



OPENING ACTS: Like many of their peers in the world of surgery, Ron Alterman, (above, clockwise) Thanh-Nga Tran, and John Meara travel to wherever their skills and expertise are needed.

Dominic also became a patient of Meara's, and, like Dumanel's, his facial cleft and encephalocele were repaired. Meara, the Steven C. and Carmella R. Kletjian Professor of Global Health and Social Medicine in the field of Global Surgery at HMS and plastic surgeon-in-chief at Boston Children's Hospital, has spent years treating patients wherever he finds them, working on the cleft palates and craniofacial anomalies of patients in southeast Asia, Australia, the Caribbean, and the United States. He says he doesn't think of his work at Boston Children's and his global surgery work as separate practices.

"Human beings have the same problems and diseases regardless of whether they're in Boston or Bangkok," Meara says. "They should have the same care, wherever they are."

In Sync

Ron Alterman would more than agree with Meara on the need to improve surgical care and access to such care throughout the world. His work in Chile sets inequities in surgical care and facilities in sharp relief.

In 2014, Alterman, an HMS professor of neurosurgery and the head of neurosurgery at Beth Israel Deaconess Medical Center,

traveled to Santiago to perform the first deep-brain stimulation procedure undertaken in Chile's public hospital system. He was invited by David Aguirre-Padilla, a Chilean neurosurgeon who had spent time in Boston working with Alterman on various neurosurgical techniques, particularly those involving deep-brain stimulation. Aguirre-Padilla hoped to use deep-brain stimulation to treat a young patient who suffered from generalized dystonia, a neurological disorder in which out-of-sync firing of neurons in the brain cause the muscles of the body to contract involuntarily.

Deep-brain stimulation works like a pacemaker for the brain, sending synchronized electrical signals into specific regions of the brain where electrodes have been implanted. The electrical pulses help regulate the firing of neurons and thus calm the involuntary contractions. To make sure the electrodes are properly placed, a surgeon takes a reading of the patient's brain activity while the wires are being implanted. Conditions must be controlled within the operating room to ensure clean readings: if, for example, there are electrical wires that aren't properly shielded, background noise can perturb the readings from the implanted electrodes.

Alterman has performed this surgery thousands of times in operating rooms in New York City and Boston, so the complexity of the procedure did not trouble him. What did present a challenge that day, he says, was the fact that the hospital's CT scanner broke, stymieing efforts to visually check the placement of the electrodes. To get a visual read on their placement, he and his patient had to take an ambulance across town to a hospital with a functioning MRI.

Although the patient came through the surgery well, Alterman points out that the lack of suitable support equipment made a complex procedure more challenging than necessary—and could have the same effect on routine procedures. Reliable equipment, a consistent supply of electricity, and clean water can be hard to maintain in some countries, Alterman says, adding that it is a problem that will need to be addressed as Chile and other nations develop their surgical capacity.

Those who question whether surgery should be considered part of global health development often cite this need for across-the-board modernization and standardization as reasons for keeping surgery out of these development discussions. The costs are said to be too steep with the feeling being that focus should instead be placed on efforts such as eradicating a single communicable disease or providing anti-malarial bed nets, which offer quicker and more obvious returns on investment. By contrast, those who want to keep surgery on the table during global health development discussions point out that the basic infrastructure improvements being advocated for surgical care are also needed for effective nonsurgical care.

Light Duties

The need for better surgical equipment and training in her native Vietnam prompted Thanh-Nga Tran '05 to establish and maintain a center that offers continuing medical education and modern tools to Vietnamese dermatologists.

When Tran returned to Vietnam during her residency with the Harvard Dermatology Program, she saw many children with disfiguring birthmarks. She was also startled to see some who had been burned and scarred by radioactive phosphorus, an outdated technique for treating vascular anomalies. Tran realized that the scars she saw on her young patients weren't from a disease or accident, but from a misguided treatment.

Tran knew that one laser and a team of volunteer doctors in a rented room would not reach enough patients or make the systemic changes needed, so she developed partnerships with local doctors and institutions.

"The cure shouldn't be worse than the disease itself," says Tran, an HMS instructor in dermatology at Massachusetts General Hospital and cofounder of the Vietnam Vascular Anomalies Center, now part of the Ho Chi Minh City University of Medicine and Pharmacy.

During her training at HMS and MIT, Tran had learned about using lasers to treat hemangiomas, the rubbery nodules of extra blood vessels in the skin sometimes known as strawberry birthmarks. With the help of her mentor, Richard Anderson '84, an HMS professor of dermatology at Mass General, she obtained a donated laser and set out to find a way to get better treatment to the people who needed it.

Tran knew that one laser and a team of volunteer doctors in a rented room would not reach enough patients or make the systemic changes needed, so she developed partnerships with local doctors and institutions. The center now offers continuing medical education training to Vietnamese dermatologists and has launched a public education campaign on the dangers of using radioactive phosphorus as a dermatologic treatment. Center personnel also have convinced the main cancer hospitals and practitioners in Ho Chi Minh City to end their use of radioactive phosphorus.

Throughout the HMS community, the individual humanitarian efforts of professionals like Alterman, Meara, and Tran are being augmented by large-scale projects aimed at addressing the lack of surgical infrastructure around the world. In 2012, the Dana Farber-Brigham and Women's Cancer Center, for

example, collaborated with Partners In Health and the Rwanda Ministry of Health to open the first comprehensive cancer referral facility in rural East Africa, while surgeons from Mass General have been developing surgical education programs in Liberia and Bangladesh since 2002. Yet the question of how to fit all these pieces together to solve the puzzle of improving surgery worldwide remains.

Weights and Measures

From the beginning, Meara says, the goal of the *Lancet* Commission wasn't just to quantify the lack of global surgical capacity; it was to create a base of knowledge and measurable indicators that could be used to build that capacity in a coherent, focused way.

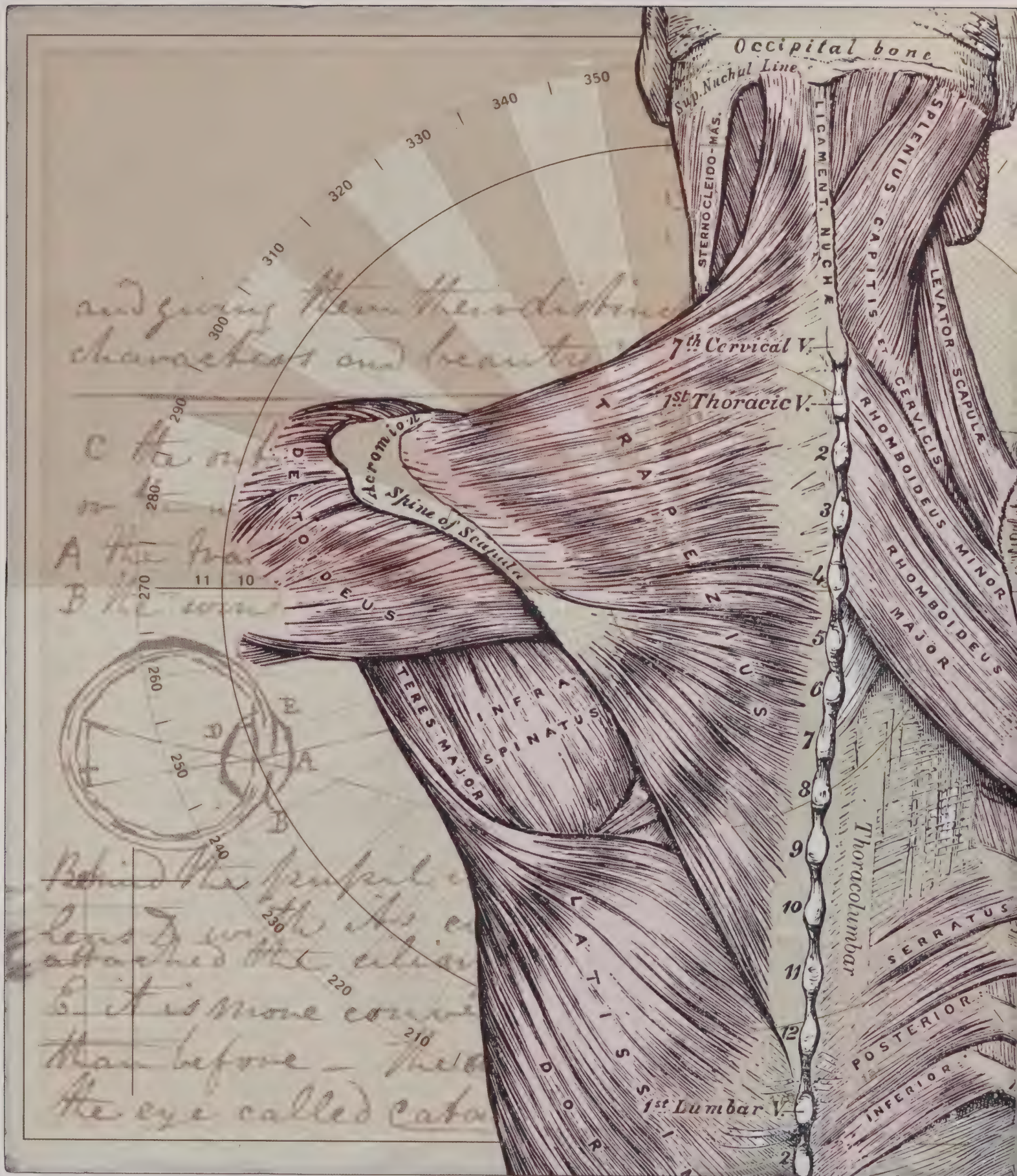
When the commission was established in 2013, Meara adds, no one knew what was going on with surgery around the world. There were no comprehensive assessments of how many surgeons worked in different countries, few records of how many or what kinds of surgical procedures were being done in a given country each year, and no reliable estimate of what percentage of a population lived within two hours of a hospital that offered essential surgical procedures.

Even the most basic safety index—how many people survived surgery—has often gone unknown, almost completely absent from international development databases and national health care planning reports.

According to Meara, the commission has been able to derive rough estimates of various measures in many countries, but detailed measures remain elusive. Since the commission published its report in April 2015, Meara has had the growing corps of surgeons working in the Paul Farmer Global Surgery Fellowship in the HMS Department of Global Surgery and Social Change focus on collecting key indicators of surgical capacity from more than one hundred countries and on developing better, more detailed analyses of the data that are available.

The important thing, according to those involved in assessing surgery worldwide, is to know that surgery is not a separate entity that competes with all the other changes needed in health care systems. It's not just about broken legs—it's about obstructed labor, cancer, infectious disease, and every other condition you can name. ■

Jake Miller is a science writer in the HMS Office of Communications and External Relations.



Anatomy courses allow
young surgeons to
gain experience and
perspective
by Bobbie Collins

Thinker Tailor Surgeon Trainer

A thoracotomy is not something a surgeon in an emergency department does every day. When, as a resident, Noelle Saillant was faced with having to perform the procedure, she realized the conditions were not ideal: the lighting wasn't good, the room was less than sterile, and the patient was in arrest after having stabbed herself in the heart. Although the attending had been called, Saillant, now an HMS instructor in surgery at Beth Israel Deaconess Medical Center, knew she had to act before he arrived.

Her brain began moving through the procedure: Open the chest. Open the heart and release the blood surrounding it. Repair the damaged ventricle. Cross-clamp the aorta. Restore and stabilize the blood pressure.

A surgeon needs to be a creative problem solver, a technician, and a scientist. Experience builds those skills, but for surgeons new to the profession, it's valuable to gain experience not only in the operating room but also outside

that pressured setting. At HMS, the opportunity to learn away from the hospital is available in a surgical anatomy class as well as in weeks-long sessions that concentrate on skills development. These programs allow students and residents to develop judgement and learn how to communicate compassionately while also refining their skills in using surgical tools to cut, repair, and sew.

Dry Run

Only two days before she needed to perform the thoracotomy on a real patient, Saillant had practiced the procedure on a cadaver in the School's advanced surgical anatomy course. During that training, she had opened the thoracic cavity, taken the time to explore the anatomy in the chest cavity, found where the phrenic nerves lay so she wouldn't accidentally cut them, learned the vital skill of cross-clamping the aorta so that the brain continues to get blood, and finally, evaluated the heart's anatomy.

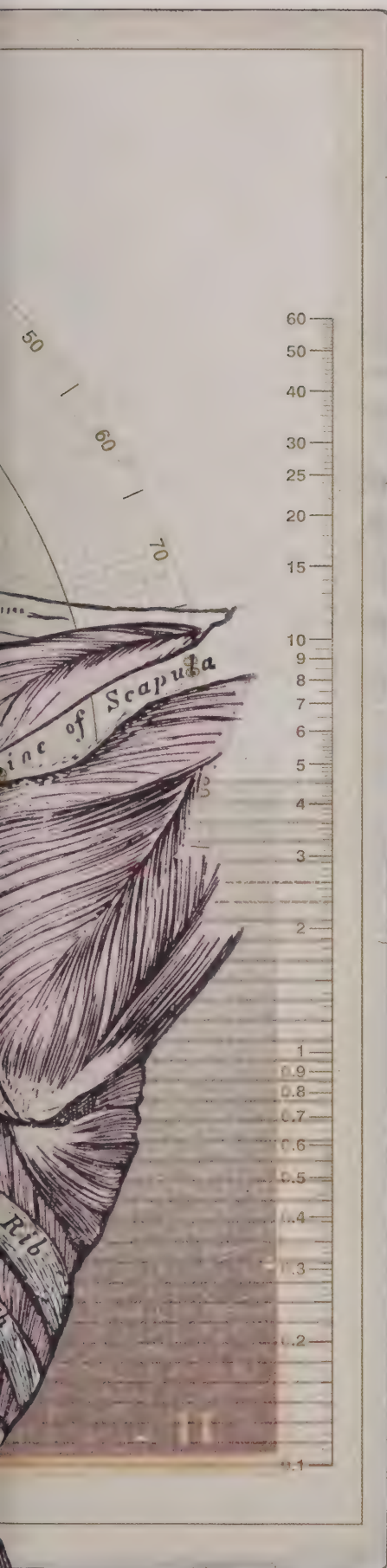
So, when confronted with the situation in the emergency department, Saillant says, "I just knew what to do. And I knew how to do it."

According to Saillant and Trudy Van Houten, an HMS clinical instructor in radiology who directs or co-directs many of the School's anatomy courses offered to medical students and residents, allowing surgical residents to focus on anatomy in an academic setting is a newer approach in their training. Even though working on a living patient is different—a cadaver has no blood and its tissue has a texture that differs from that of living tissue—the training is valuable. In the class, residents can move the layers of tissue, muscle, nerve, and bone at a pace and with a level of scrutiny that surgeons would never be able to accommodate when operating on a living patient. In addition, a spirit of inquiry pervades the course, and participants are encouraged to question.

Hand-Eye Communication

"Surgical approaches are never more extensive than they are in the anatomy lab," says Van Houten. She has designed and written laboratory manuals that include anatomical background information and dissection sequences based on surgical approaches and clinical standards.

The surgical anatomy dissection course has proved beneficial to residents' competence and confidence. A 2016 study in the *Journal*



MATTIAS PALUD/HENRY GRAY/PUBLIC C. MAIL

of *Surgical Research*, authored by Van Houten and colleagues at Brigham and Women's Hospital, reported that second- and third-year surgery residents who had performed such dissections showed greater proficiency and reported higher confidence in their surgical ability than those who had received access to course materials, including laboratory manuals and links to videos, but had not performed surgical dissections on cadavers.

Techniques can be taught and then honed, but according to Van Houten, it is often possible to discern which residents have the combination of skill and aptitude needed to become good surgeons. Promising residents have a knack for revealing and manipulating the layers of tissue, organ, and bone; an eye for distinguishing the body's structures as well as the ability to envision the anatomy beyond what they see; the cognitive skills to plan and make visual-spatial connections; and a drive to question and think critically about what they are learning.

Both Saillant and Van Houten speak of the continuous and layered teaching and learning that make up the career of a surgeon. At HMS, attendings teach residents, residents teach interns, and attendings, residents, and interns teach medical students.

Needlework

According to George Dyer '02, the director of the Harvard Combined Orthopaedic Residency Program, residents can also practice their technical skills in the simulation labs at the program's four hospitals: Beth Israel Deaconess, Boston Children's Hospital, Brigham and Women's, and Massachusetts General Hospital. During a month-long boot camp, residents are relieved of their daily responsibilities and given time to focus on improving their surgical skills. During a session at Brigham and Women's STRATUS (Simulation Training, Research, and Technology Utilization System) Center, for example, participants sutured incisions in pigs' feet. Dyer,

who also is an HMS assistant professor of orthopedic surgery at Brigham and Women's, explains that sewing is one of the simplest things that a surgeon does besides cutting. In the simulation lab, the residents are able to perfect that skill in a setting that provides "more of a learning experience than a task to be learned in process," he says. The instructors tailor their comments; they might direct one resident to move his hand ten degrees, suggest that another orient her head differently to better view the surgical field, or encourage all to hold their suture needles at a particular angle. "Deliberate practice makes more efficient, safe, and effective habits as a surgeon," says Dyer.

Make a Note

Although the steepest part of the learning curve for a surgeon occurs during residency and the first years of practice, Dyer says improving one's surgical skills is a lifelong endeavor. As many surgeons do, Dyer keeps a journal; one from his days as a resident is filled with his drawings and notes on various surgeries. Journaling, he says, gives him the opportunity to do a surgery three times: once in his head to prepare, once with the patient, and once again afterward, when he re-creates and revisits his actions.

Mortality and morbidity conferences, the review sessions held for surgical staff, are a hallowed tradition, according to Dyer. M&Ms, as the sessions are colloquially called, bring staff together to review all surgical cases that had complications. This systematic approach to tracking patient outcomes traces its roots to Ernest Amory Codman, Class of 1895, and the surgical evaluation meetings he initiated at Mass General in the early 1900s. As then, selected cases with morbidities that have teaching value are highlighted. Today, all deaths are also discussed. Dyer says these sessions are the most important thing surgical groups do to maintain quality assurance and the rigor of training. Sometimes, he says, errors can be seen only in retrospect. By sharing their cases, surgeons pass along lessons and benefit from one another's experiences, all to improve skills and patient outcomes.

Van Houten has long been impressed by the community surgeons create. "They're enormously supportive of each other in situations most of us can't even imagine encountering." ■



TEACH ONE: Surgical residents have the time to question and perfect the finer points of surgery in dissection courses and surgical workshops like those overseen by Trudy Van Houten (left) and George Dyer.

Bobbie Collins is the editorial production coordinator in the HMS Office of Communications and External Relations.

FROM THE COLLECTIONS AT HARVARD MEDICAL SCHOOL



DIGITAL CLIP: Ernest Amory Codman designed and patented surgical scissors that he recommended surgeons wear on, and manipulate with, the third and fourth digits of their dominant hand.

BECAUSE SURGERY SOMETIMES REQUIRES on-the-spot innovation, as well as continual review and improvement of technique, the specialty tends to attract a certain type of tinkerer—one who enjoys taking a hands-on approach to solving a problem.

Ernest Amory Codman, Class of 1895, surgeon and innovator, exhibited this tendency in a big way. An early interest in bones and in the promise of X-rays to

treat their diseases led to his forming, with physicians James Ewing and Joseph Bloodgood, a bone sarcoma registry. Codman hoped the registry would provide not only statistical data but also yield insights into tumor behavior and treatment options.

Through a letter mailed to members of the American College of Surgeons in 1920 and published in the *Boston Medical and Surgical Journal* in 1922, Codman

asked readers to send him case summaries of living patients who had undergone surgery for bone sarcoma. Codman eventually received nearly 200 responses to his request.


In that same year, he published an article titled “A New Instrument to be Called the Registry of Bone Sarcoma Scissors,” in which he introduced his newly designed and later patented surgical cutting tool.

Codman’s hope for his tool? To sweeten the pot for surgeons thinking of contributing cases to his registry. As he wrote, “It is my hope...that it will become...socially uncomfortable for any surgeon who is found using this appliance, if he has not recorded his cases of bone sarcoma to the best of his ability.” The record does not show that the imagined social discomfort occurred—nor that Codman ever made any money from the scissors.

Codman’s scissors may not have taken off, but his registry did. It is the first national prospective study of disease and a model for the study of other diseases—an enviable legacy. From this registry arose standardized nomenclature and categories of bone tumors, as well as the concepts of hospital standards and cooperation among radiologists, pathologists, and surgeons in the common goal of treating the patient.

The registry was rooted in Codman’s deep belief in end results—how the patient fared after treatment and what medicine could have done better. This concept, now standard practice, was heretical in 1915, when Codman first proposed it to his colleagues and was nearly expelled from the profession for it.

—Susan Karcz



When the truth of what's published is questioned, an institution's research fraud investigators may need to step in **by Ellen Ishkanian**



data don't lie, do they?

Laid side by side, the slide shown at a conference in the late 1980s appeared similar, but certainly not identical, to a figure in an article in a leading scientific journal. ■ But the charge being leveled by the article's author, recalls Margaret Dale, the former dean for faculty and research integrity, then a part of the School's faculty affairs group, asserted that the slide was a copy of one in his published work.

JOHN SCARLES

Mortimer Litt

The allegation became a case for Mortimer Litt, the School's point person for academic and research integrity.

Litt, chief scientific investigator for the Office of Academic and Research Integrity at HMS, carefully examined the two slides. In a style that has become his signature over nearly three decades as a pioneer in the field of research integrity, Litt forged a path to find the truth: Instead of enlarging the photographs to discern similarities or marked differences in the images, he looked at the microscopic particles that are inadvertently deposited on every slide during preparation.

Litt found distinct, exact patterns of debris speckling each slide, indicating that the slides were identical. The allegations of plagiarism were true.

"It would have been very difficult to prove, but Mort found a creative way to investigate the allegation, and then presented his findings in a way that everyone could see clearly and understand," Dale says, still amazed at her former colleague's ability to sort through volumes of complex information to find answers to seemingly insoluble questions.

The 90-year-old Litt still arrives at his small, sunny office every morning to go about his job of finding the truth, just as he has done since the late 1980s. Litt and his colleagues in the School's academic and research integrity group have in fact shaped how research integrity investigations are handled, not only at HMS, but at the federal level as well.

The Prepared Mind

On the bookshelf to the right of Litt's uncluttered desk are stacks of manila folders, about seventy, he estimates, each containing a precisely detailed report of an investigation he has conducted into allegations of misconduct, fabrication, or plagiarism at research laboratories at HMS and its fifteen affiliated institutions.

How he came to be an investigator of research fraud is a story in itself, one marked by what Litt describes as "experiences—and luck."

From a public high school in Brooklyn he enrolled at Columbia University, where he began his studies in philosophy but ended as pre-med. It was luck that put him in charge of a crew of medics at a U.S. Army hospital in Japan during World War II, a stroke of serendipity, he says, that reinforced his interest in the possibility of a career in medicine.

After returning home from the war and graduating from Columbia, he applied to

twelve medical schools, but wasn't invited to interview at any of them.

Once again, luck intervened. One of his professors offered him a chance to "do routine work" in a leading research laboratory at the Rockefeller Institute for Medical Research in Princeton, New Jersey.

There, Litt says, he got a feel for what working in a medical laboratory could offer, and, with the recommendations of his supervisors at the institute, he was accepted into medical school at the University of Rochester.

Weight of Evidence

Litt is soft-spoken, focused, and passionate as he explains his drive to unlock secrets contained in detailed lab notes, photographs, complex calculations, techniques, and in the words used by scientists up and down the hierarchy of the research community.

"Our job is to find the truth," he says.

At stake are not only reputations but the integrity of science, as noted in a 2015 semi-annual report from the National Science Foundation's Office of Inspector General. Research misconduct, it says, "damages the scientific enterprise, is a potential misuse of public funds, and undermines the trust of citizens in government-funded research."

That same report summarizes findings of an analysis that looked for evidence of plagiarism in the more than 8,000 proposals awarded by the NSF during fiscal year 2011. Using commercial plagiarism-detection software, the office assessed how much of each proposal's text appeared to be copied.

Although many proposals contained some copied text, the amount of copying found in others led to thirty-four plagiarism investigations. Ten of those resulted in findings of research misconduct, which, at the time of the report, led to the recovery of \$357,602 in federal funds.

A 2012 study, published in the *Proceedings of the National Academy of Sciences* by researchers at the Albert Einstein College of Medicine, found that misconduct, not errors, was responsible for most retractions from journals.

Among the 2,047 retracted papers they analyzed, the researchers found that "21 percent of the retractions were attributable to error, while 67 percent were due to misconduct, including fraud or suspected fraud (43 percent), duplicate publication (14 percent), and plagiarism (10 percent). Miscellaneous or unknown reasons accounted for the remaining 12 percent."

Brodnicki says that the forensic research methodologies Litt developed at HMS are now used by the federal Office of Research Integrity and taught to people at institutions around the country.

Investigations of misconduct also carry a cost, both to individual institutions and to funding institutions. A 2010 paper reported in *PLoS Medicine* by researchers at Roswell Park Cancer Institute in Buffalo, New York, dissected the direct and indirect costs of one such investigation at their institution. When a host of factors—from loss of productivity to time lost to faculty involved in the investigation, both those accused and those reviewing the evidence, to the cost of penalties and retractions from the literature—were considered, the scientists estimated the cost of that one case approached \$525,000.

Another look at the cost of misconduct appeared in 2014 in the online journal *eLife*, this one focusing on work funded by the National Institutes of Health. Its authors found that research papers retracted because of misconduct "accounted for approximately \$58 million in direct funding by the NIH between 1992 and 2012, less than 1 percent of the NIH budget over this period." While the financial toll was less significant than what the authors expected, they did find that the toll on researchers' careers was steep, with many being derailed.

Foundational Work

It was in the mid-to-late 1980s when a particularly complicated case found its way to



Gretchen Brodnicki

the desk of Eleanor Shore '55, then dean for faculty affairs and responsible for overseeing the rare allegation of wrongdoing for research conducted at the School.

When the case arose, a colleague suggested to Shore that Litt might lend a hand.

"What Mort did" recalls Gretchen Brodnicki, the dean for faculty and research integrity in the Office of Academic and Research Integrity, a stand-alone office at the School since 2008, "was to create a new discipline, to professionalize and standardize the assessment of concerns about data integrity, the assessment of figures, of data, and of publications. He helped establish a mechanism to determine whether there are issues of integrity."

"It just didn't exist until he started doing this work," she adds.

Brodnicki says that the forensic research methodologies Litt developed at HMS are now used by the federal Office of Research Integrity and taught to people at institutions around the country.

According to Dale, Litt got involved in that first case shortly before the School's comprehensive conflicts of interest and commitment policy was implemented. Questions of research misconduct would arise infrequently—and never with the idea that one would appear again anytime soon.

Today, there are twenty-five to thirty allegations that come across Brodnicki's desk each year involving researchers at the School or its affiliated hospitals. The pressure to publish is a driving motivator behind the higher numbers, Brodnicki says.

Publishing drives academic research today and can mean funding, promotion, success, or that next job. For some people, it can mean staying in this country, as publishing can serve as a basis for visa applications.

But the primary reason Brodnicki thinks her office sees more cases today is because there is so much more external scrutiny than in the past. Why? The internet.

"The number of queries we get from outside sources has skyrocketed," she says, while the number of cases coming from someone who has seen, witnessed, or been privy to misconduct has remained unchanged.

Also consistent is HMS's numbers compared to those of other medical schools. Yet, because Brodnicki's office reviews cases

from all the School's affiliated institutions, the numbers can seem high.

Whatever It Takes

The review process follows strict federal regulatory requirements, but remains an academic review by fellow scientists: The facts and circumstances are adjudicated by full professors. The proceedings are kept confidential unless and until there has been a determination that a researcher has engaged in research misconduct.

Litt emphasizes that "an allegation is just that; it's not proof," so keeping all information confidential is vital to avoid the risk of seriously and unduly damaging a researcher's reputation.

Allegations of falsification, fabrication, or plagiarism of data can be made in any number of ways. It may begin with an email from a colleague at the next laboratory bench who saw something that looked odd. Or someone might walk into Brodnicki's office saying that "someone published this work, and it's my work," with supporting documentation in hand. One lab may allege wrongdoing by another lab on campus, or allegations may come from people at other institutions in the United States or elsewhere.

Dale remembers a call that came from a researcher in Russia who read a paper and saw a figure that didn't make sense. The researcher looked up Dale's name on the HMS website and sent her his concern.

"And there was a problem," Dale says.

After an allegation is made, Brodnicki and members of her team, which very often includes Litt, meet to determine whether the allegation meets the definition of research misconduct, defined by the U.S. Office of Research Integrity as "fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results."

"If someone says, 'I tried to do this work in my own lab, and I couldn't make it work in the same way, and so I think this person falsified the data,' that kind of complaint will not necessarily meet the definition of research misconduct," says Brodnicki. "The definition of research misconduct does not include honest error or differences of scientific opinion."

When an allegation does satisfy the definition, it enters the inquiry phase. The accused is formally notified and three full professors who work outside the department of the accused but have relevant scientific expertise form a panel to assist in the investigation.

The accused is given an opportunity to assess panel members for possible conflicts. Those being investigated may hire outside counsel.

At this point, all information related to the research in question, including lab notebooks, computers, computer drives, and supplemental material, is sequestered. This is also when Paul Russell, the John Homans Distinguished Professor of Surgery at Massachusetts General Hospital and the chair of the Standing Committee on Faculty Conduct at HMS and HSDM, often gets involved. A determination is made either to close a case because no misconduct was found or proved, or to move forward to a full investigation.

An investigation can take a year or two to complete. It is in this protracted period of data sifting that Litt's work as a sleuth has helped shape the field.

Litt can spend hundreds of hours poring over manuscripts and laboratory materials in cases where plagiarism is alleged.

"I read a paper, I look at the bibliography, and I will do a character-by-character analysis," he said.

Litt notes that as Russell's standing committee works on a case, they reference not only the forensic findings but also the physical exhibits that Litt carefully constructs. For example, in cases where written work is thought to have been borrowed without attribution, Litt prepares exhibits displaying the original and the alleged copy and marks identical words in green and similar words in yellow. If Litt has indeed found the work to be a result of plagiarism, his displays will show it at a glance, in vivid detail. Litt dismisses software designed to find plagiarism, and Brodnicki says he does catch things that such programs miss. "Software will identify identical text," says Brodnicki, "but nothing can take the place of human assessment of that text and whether there may be an explanation for the reuse of certain text."

Russell also points out Litt's ability to find patterns, whether they are in copied photographs, in dubious calculations, or experiments.

"Not infrequently the evidence is clear that something in the laboratory, a critical program, has gone awry," says Russell. "And it's up to us to decide: Has it been a matter of malfeasance, has it been a matter of mistakes, or has it been a matter of misbehavior?" he adds. "We must decide, is this person a knave or a fool?"

It is often Litt's work, Russell says, that helps answer the question of intent, a key criterion in a finding of misconduct.

"It's up to us to decide: Has it been a matter of malfeasance, has it been a matter of mistakes, or has it been a matter of misbehavior? We must decide, is this person a knave or a fool?"

Does every miscalculation, every sloppy technique, every altered slide tip the conclusion in the direction the researcher would like to see? What is the plausibility of the mistakes? Can the circumstances in which they were made be re-created? Is there a consistency with which the mistakes occurred? Litt's answers to these and other questions find their way into a report that Russell's standing committee uses to make its final determination of whether there is research misconduct, and if there is, to make a recommendation on what measures should be taken.

The discussions are emotional and often difficult, according to Litt and Brodnicki, with outcomes that can range from lauding the person who has been reviewed to dismissing the individual.

"When I make connections, it satisfies me intellectually," Litt said. "But along with that, I feel the tragedy of the situation."

For Litt and the others who every day see work being done by brilliant, dedicated scientists who maintain strict integrity right alongside the few who are intentionally, knowingly, or recklessly trying to tip things in their favor, the difference is stark.

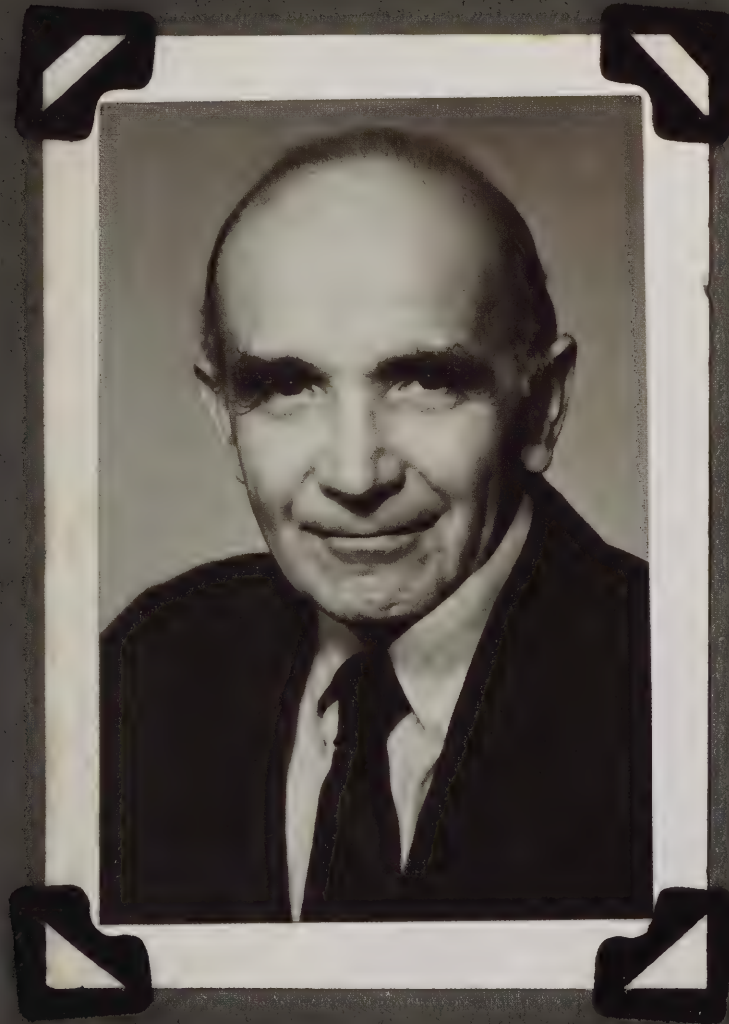
"It's a double-sided experience, one positive and one negative, side by side," Litt says. ■

Ellen Ishkanian is a freelance writer based in Massachusetts.



Paul Russell

A VIEW OF LONDON



A vision of collaboration and scientific inquiry remains vital after forty years
by Sharon Clark

This past year, I had the opportunity to be in Boston for my reunion. The visit gave me a chance to catch up with people so important to me during my years as an HMS student. In particular, I was able to spend time with Irving London '43, cofounder of the Harvard-MIT Health Sciences and Technology (HST)

Program—the same program I was enrolled in at HMS. Talking with London, “Irv” to so many of us, allowed the debt of gratitude I have felt for him and the HST program to resurface. Both the man and the program were pivotal to my development as a physician, a scientist, and, I think, a person.

In the fall of 1975, I left California and my life at Stanford University and headed to Boston. As a senior, I had been considering applying to medical schools with combined MD-PhD programs, as well as the one at Stanford. I felt I needed to see what other programs might offer because I was looking for a strong graduate science program and a clinically strong medical center.

When I visited Harvard, people at HMS knew I was coming and they made an effort to sandwich in some interviews with someone who had reviewed my application: London. I remember visiting with him at MIT. He set a relaxed tone immediately with his wonderfully warm voice. Our conversation ranged from my research projects, both current and past, to his vision for the growth and development of the HMS-MIT program. He had recently set up the program with Herman Eisen, an immunologist who was a founding faculty member in MIT's Center for Cancer Research. I was captivated by our conversation—here was someone who understood the depth of my interest in science and also valued the challenge of looking to rigorous science for ways to question and improve medicine. Most of all, I felt he was someone I could trust. The HST program that he and Eisen were establishing was something different in medical education; I knew they would make it happen.

The Love of Learning

For me, my years in the HST program proved the wisdom and beauty of London and Eisen's vision. The goal of the program was to expose me and my twenty-five classmates to a world of academic rigor, scientific inquiry, and collaboration while also preparing us to become medical clinicians. The paradigm of the physician-scientist was not new, but at the time,

their approach to this education was. The HST curriculum was demanding. Classes were rigorous, and each of us had to pick an area of concentration—mine was neuroscience—and defend a thesis. Preclinical course instructors eschewed memorization as the sole tool for learning. We were directly and indirectly reminded that we were there to question and that meant we questioned the dogma of any given area of medicine. Perhaps it was an outgrowth of London's rabbinical training, or just the natural approach of someone for whom teaching and learning are everything, but in this program, pedagogy was valued as much or more than innovation and invention. A love and respect for learning seeped into our bones.

Critical thinking was demanded, and intellectual daring was nurtured. To help us develop the skills to critique medical and scientific papers relevant to the lectures, we worked from peer-reviewed papers drawn from the medical literature. Recently, I read an article in *Harvard Magazine* about the waning days of the classroom lecture. That article led me to realize something else about our program: We were never truly lectured to. With our small class size, we could easily engage with those teaching us. From the moment each morning when we boarded the yellow school bus at Vanderbilt Hall for our trip to MIT or Harvard Yard, to our return to the HMS quadrangle, we were encouraged to talk with one another about what we'd learned and to use that new information to generate ideas.

Although I knew that London and Eisen had built their respective portions of the program from scratch, it was Walter Abelmann's book on the first twenty-five years of the program that helped me to appreciate the amount of work that went into that launch. Gathering the top-notch faculty may have been made easier by the fact that the program allowed them to teach in an environment that excited them—in a small classroom to eager students who had open, inquisitive, and science-driven minds. One of the many examples is found in the program's neuroanatomy course. London recruited Walle Nauta, a neuroanatomy professor at MIT who many considered to be a founder of the field of neuroscience, to teach it. That course alone inspired many in my class to seek careers—and to make breakthroughs—in neuroscience.

Model in Action

My recent visit with the ninety-six-year-old London reminded me of another aspect of the program: the mentorship it provides its students. In fact, for me, London may be the

ultimate mentor. He challenges people, especially students, to achieve their best and, for those of us in the HST program, to achieve through discipline and study. I found his challenge to be personally valuable when, while a resident at Stanford in plastic surgery, I did a rotation in hand surgery. I noticed that following surgery to correct damage from injury, patients' hands often had highly varied results with re-establishing a sense of touch. While I was in the HST program, I had taken a seminar at MIT on the electrophysiology of the primate motor cortex. Since then, I had continued to follow research developments in neurophysiology so I knew that researchers at the University of California, San Francisco, were using primate animal models to study how the somatosensory cortex, the area of the brain that processes sensory information, was responding to limb amputations. I wanted to know how the perception of touch rewired after reconstructive procedures that entailed the movement of tissue and nerve repairs. I wanted to know if, by understanding the neurophysiology of plasticity, we could improve the ability to process sensory information and improve the function of injured limbs.

To address this question, I tapped my HST training in neuroscience and the power of combined institutional resources, and formulated a proposal for a cross-institution study to investigate the role that plasticity plays in patients who undergo hand surgery following trauma. Soon, the weekends I was not performing surgery at Stanford were spent at UCSF gathering and analyzing data on the plasticity of the somatosensory cortex in the primate. This work led to publications in *Nature* and the *Journal of Neurophysiology*; many feel that these data have been key to better understanding ways to improve sensory recovery in hand therapy. My interest in using basic science, analysis, and collaboration to investigate a perplexing clinical problem of sensory perception was an approach straight out of the HST playbook.

Like all our colleagues at HMS, those in the HST program seek to advance medical science. For those of us who participated in HST and had the benefit of London's mentorship, working to advance medicine is not only a challenge we were trained to take on, it is our responsibility. I am personally grateful for the HST experience—and for London's vision and mentorship. ■

Sharon Clark '80 is a plastic and reconstructive surgeon in private practice in San Mateo, California.

A photograph of a wooden chair, possibly a Windsor-style chair, positioned in a dark, industrial-looking space. A bright spotlight from above illuminates the chair and casts a long shadow on the floor. The chair has a high, curved back with vertical slats and a simple seat. The floor is made of large, light-colored tiles.

Are stories of notoriously difficult

CONTINUED FROM THE PREVIOUS PAGE

STRESS FRACTURES

interviews for HMS applicants fact or fiction? by Jules Dienstag

In 2012, I asked alumni, including readers of this magazine, for any recollections they had of Daniel H. Funkenstein and the stress interview. At that time, I was more than a decade into my exploration of the topic of stress interviews at HMS, a search spurred by my curiosity about the accuracy of such stories and their persistence. ■ Although Funkenstein stopped interviewing applicants in the early 1970s, stories of his stress interviews are still exchanged, often in the belief that such interviews continue to take place at HMS. During my two decades as a member of the HMS Committee on Admissions, I was repeatedly surprised to learn from applicants that they expected to be subjected to stress interviews. This notoriety contrasted starkly with the prevailing admissions position on interviews—that every effort be made to be warm and welcoming and that deliberately stressing applicants was disrespectful and counterproductive. Each year, at the beginning of admissions season, we would hold workshops on making the interview process a positive experience, one that afforded applicants the opportunity to be at their best; presented the medical school in a welcoming light; and gave applicants the information they would need to decide whether HMS would be a good fit.

Despite our efforts, however, HMS had a reputation, seeded in the middle of the twentieth century, for subjecting interviewees to uncomfortable psychological torment, and that reputation had become lore well beyond HMS.

The Man in the Mirror

How widely the stories of Funkenstein and stress interviews were known became clear during online searches I conducted. One such search highlighted a 2008 *Psychology Today* blog about stressing presidential candidates. “How do they respond to provocation?” it asked. “Harvard psychiatrist Daniel Funkenstein was famous for his ‘stress interviews.’ He might ask someone to open a window—one that had been nailed shut.”


Most stories of stress interviews cite tactics attributed to Funkenstein during the more than two decades he served as a member of the Committee on Admissions (1952 to 1975). Linking Funkenstein with the topic of stress would not have been unusual; he was a psychiatrist who, as a member of the School’s faculty from 1946 to 1975, studied stress and published about trends in medical school applicants.

Yet, in the summer of 2015 when I contacted Daniel L. Funkenstein ’68 about the stories linking his father with stress interviews, he told me he did not know whether the stories were true. While the younger Funkenstein knew nothing objective about his father’s association with stress interviews, he did remark that, although his father had been dead for more than twenty years, he “would be pleased to know that people are still paying attention to him.”

When Funkenstein senior died in 1994, son Daniel mentioned in a memorial remembrance that his father’s “mastery of the ‘Stress Interview’ was an annual feature of the Second Year Medical School Student Show.” Indeed, in the archives at the Countway Library of Medicine, programs produced for HMS Second Year Shows in the 1960s and 1970s often include a name resembling Funkenstein in the dramatis personae. In December 1961, for example, student Steven Schroeder ’64, currently the Distinguished Professor of Health and Health Care in the Division of General Medicine at the University of California San Francisco, played “Dr. Flunkemclean, who stresses interviews and washes brains.” According to Schroeder, in his skit he pantomimed nailing a window shut and inviting

ISTOCK (OPENING SPREAD); HARVARD MEDICAL LIBRARY IN THE FRANCIS A. COUNTWAY LIBRARY OF MEDICINE





There was the Harvard faculty member who would invite a trembling candidate to take a seat—in an office bare except for the interviewer's desk and chair. If the student just stood there looking blank and baffled, he was out.

in an applicant. He then declared that "it is hot in here," and asked the applicant to open the window. After trying in vain to open the window, the applicant turned to the audience exclaiming, "Hey, some [expletive] nailed this window shut," which Schroeder says elicited a big laugh.

In *Harvard Med: The Story behind America's Premier Medical School and the Making of America's Doctors*, author John Langone addressed stress interviews in a chapter on getting in to HMS.

"There is a wealth of stories, apocryphal and unbelievably true, about the way it was. There was the Harvard faculty member who would invite a trembling candidate to take a seat—in an office bare except for the interviewer's desk and chair. If the student just stood there looking blank and baffled, he was out."

Elsewhere in his book, Langone quotes the late Clifford Barger '43, formerly the Robert Henry Pfeiffer Professor of Physiology and chair of the Department of Physiology at HMS, on the subject of Funkenstein and stress interviews.

"It became obvious that most people on the admissions committees shouldn't be there. There was the psychiatrist who used to nail down the window. Terrible. I used to argue with him about that."

Some who recalled Funkenstein had more temperate assessments. Gerald Foster '51, a Massachusetts General Hospital internist who served as faculty associate dean for admissions from 1982 to 1998, told me that although Funkenstein had an off-putting air, "All the stories are really not true. Every 'storyteller' didn't experience it firsthand, but always knew someone who knew someone

that it happened to. When I was in charge, there were stories about his interviews long after he stopped doing interviews."

On the Record

Some anecdotal data on Funkenstein and his interview style emerged in a transcript from a 2006 University of Wisconsin oral history of one of its faculty members, geneticist Paul Sondel '76.

"...I had an interview with Dr. Daniel Funkenstein, a faculty member in the Department of Psychiatry. I didn't know this at the time, but he was famous for stress interviews. I went into his office and sat down. ... Then he said, 'It is a little hot in here. Do you think you could open the window?'

"So I went over to open the window, and I couldn't get it to open. I fidgeted with it and I unlocked it and I was playing with it. I'm looking at it and said, 'Dr. Funkenstein, this window looks like it's painted shut. I'm not sure I can open it.'

"He said, 'Oh, yeah, you can open it.'

"I said, 'I'm sorry. I can't open this window. I apologize, but I just don't think I'm going to get it.'

"He said, 'Well, okay, never mind.' The window was really painted shut. I'd never been through something like that ... I left there just devastated. ..."

A vivid eyewitness account can be found in Thomas Lee's book, *Eugene Braunwald and the Rise of Modern Medicine*. In 2009, as part of his research for the biography, Lee talked with cardiologist Burton Sobel '62, one of Braunwald's early trainees. Sobel told Lee that, at Thanksgiving of his senior year at Cornell University, he received a telegram from HMS offering him an interview. He was assigned to Funkenstein.

"I went into the interview, and there was no place to sit," Sobel later recalled. "He asked me to open a window ... and it's either nailed or glued shut. I couldn't open it.

"And then he offered me a cigarette. In those days, everyone smoked, including me. I took the cigarette, and there was no ashtray. So I was standing with a window that I couldn't open and a cigarette that's dripping ashes all over the guy's desk.

"I said to him, 'If you don't mind, I'd like a chair, and I'd like an ashtray, and then we can continue.' Sure enough, they materialized, and we continued and everything was very benign. But it was rather stressful, and I went home thinking that Harvard was not going to work out for me."

Daniel H. Funkenstein



Clifford Barger

Readers' Panel

When I asked alumni for their stories, forty-six responded, mostly individuals who had been interviewed between 1952 and 1974, including five non-HMS graduates. Although this request, and the analysis that followed, would never pass muster as scientifically valid, my inquiry did elicit a set of rich narratives, including first-person testimonies. And because most respondents reported multiple recollections, the number of incidents far exceeded the number of respondents.

Eleven of the respondents reported that their interviews with Funkenstein were not stressful, with some describing their interviews in glowing terms. Two said they were disappointed they hadn't had the stressful interviews they'd expected.

Most of the respondents described rumors or a friend's report of stressful interviews. The most commonly described rumor was of

being asked to open a window that had been "nailed shut" (sixteen respondents); one of these included the story of an interviewee who reportedly called Funkenstein's bluff by raising his shoe to break the window. Other rumored ploys included a phone that rang after the interviewer had exited (three); the interviewer hiding under the desk (three); the offered cigarette but no ashtray (two); the absence of a chair for the interviewee (one); and the interviewer's sitting in the visitor's chair, leaving his desk chair for the interviewee (one). One person described a rumor that a coin had been left on the floor to see whether the interviewee would pick it up. Another respondent told of a rumor about an interview interrupted by a telephone call; after the call ended, the interviewee was asked to repeat the conversation. Among the more colorful rumors was one that had it that

the interviewee was asked to wear the interviewer's white coat and sit in the interviewer's chair and another that said the interviewer cut off the bottom of the interviewee's necktie!

First-person stories from respondents included six recollections that Funkenstein had told them it was very hot in the room and had asked them to open a window that had been painted shut. Four reported that Funkenstein walked out of the office abruptly in the middle of the interview, another two reported that, when they entered the office, Funkenstein was sitting in the interviewee's chair, leaving his desk chair as the only free chair in the office.

The "ringing phone" experience was recalled by two respondents, with one reporting that, when he picked up the receiver, Funkenstein upbraided him for answering, and two mentioned that, for their

interview with Funkenstein, they were sent to an unoccupied floor in an unoccupied building. And one applicant, who measured in at 5 feet 6 inches, was treated dismissively by being shown an article indicating that the most predictive variable for leadership was height.

Another category of stress involved personal questions and inappropriate comments, which were recounted by five people. Such statements included “Do you like your father, do you like your mother?” or stigmatizations about background: “I see you were a music major. That must have been easy for an Italian!”

Mea Culpa

To be fair, according to the responses from alumni, Funkenstein was not the only practitioner of stressful interviews. Several respondents described inappropriate comments and questions asked by other interviewers, and one described a particularly stressful tactic used during her interview in 1973.

“When I walked into the office my interviewer was sitting behind a big desk and did not get up to greet me in any way. He handed me a legal-sized pad of lined yellow paper with COCK-ROACH written at the top of the first page. He told me to write two pages about that. The interview was over when I had finished writing.

“Now, 39 years later, it just sounds silly, but it was very distressing. And I was pretty angry about it, though I thought it was the norm and assumed there was nothing to do about it. However, a short while after that I was at an official Harvard dinner and happened to be seated next to President Derek Bok. So when he asked me how my HMS interviews were, I told him. The next week I got a call from the HMS admissions office asking me for another interview. Somewhere in my files I still have the two-page letter I subsequently got from President Bok apologizing for the interview.”

When such behavior attracts the attention of the president of the University, change is inevitable. No one interviewed after 1974 wrote in with stories of stress interviews.

Lit Crit

I had my own personal experience with Funkenstein. When I interviewed in 1968, Funkenstein looked at my record and pointed out that I was a literature concentrator. He said that the future of medicine was in biochemistry; why, he asked, did we need someone like me?

I was unprepared and insufficiently intellectually dexterous to debate logically. What I did not know that day was that, during that same year, Funkenstein had written about the importance of—and bemoaned the pressures against—a liberal arts education for students aspiring to enter medical school.

Was that a stress interview? Probably not—no gimmicks, no tricks—just a fair, challenging presentation of a hypothesis. It was, however, stressful.

The evidence, albeit anecdotal, that I gathered from alumni and others indicates that at one time HMS deserved its reputation for stress interviews. But the School’s actions since that period show that it now eschews such efforts—and is not proud of that legacy.

The power of story, however, is evidenced by the fact that this reputation has been sustained for the past six and a half decades and, astoundingly, for the four decades since stress interviews were abandoned. ■

Jules Dienstag is the Carl W. Walter Professor of Medicine at HMS and a physician in the Gastrointestinal Unit of the Department of Medicine at Massachusetts General Hospital. He previously served as a member of the School’s Committee on Admissions, as faculty associate dean for admissions and chair of the Committee on Admissions, as associate dean for academic programs and clinical programs, and as dean for medical education. The author wishes to thank the individuals who shared their stories with him.



COURT APPEARANCE:
Gerald Foster (far right) talks with two HMS students on the old Quad courtyard.

Community Connections

How does consciousness emerge from the maze of neurons in the human brain? How do we and other animals process chaotic sensory inputs from our environments well enough to initiate appropriate behaviors and solve problems?

Answers to such questions have remained out of reach in part because the neural networks in our brains are so complex. Multiply 86 billion neurons by 1,000 connections each and things quickly get out of hand.

Researchers have been making headway, largely by following two separate paths: differentiating neurons by function or mapping connections among neurons to uncover circuits.

Some neurobiologists are trying to guide those paths toward convergence by investigating how structure and function are related. Wei-Chung Lee, an HMS instructor in neurobiology, is one such scientist. He and his colleagues are pursuing so-called cellular functional connectomics. By developing faster microscopes and more powerful

computing tools and asking the right questions, they are linking anatomical infrastructure to neural circuit activity in the visual cortices of mice.

In 2011, Lee, graduate student Davi Bock, and R. Clay Reid, a former HMS professor of neurobiology who is now at the Allen Institute for Brain Science in Seattle, used two-photon microscopy to show how the functional properties of inhibitory neurons that form neural circuits could be predicted based on how they are wired with surrounding neurons in their local circuit.

But “we were just tickling the brain in terms of physiology,” Lee says.

To advance the work, Lee, Reid, and Vincent Bonin, now at Neuro-Electronics Research Flanders in Belgium, shifted their gaze from inhibitory neurons to excitatory neurons, which account for about 70 percent of cells in the cerebral cortex. This spring, they directly demonstrated for the first time that excitatory cortical neurons are organized into modular subnetworks defined by their anatomical connectivity.

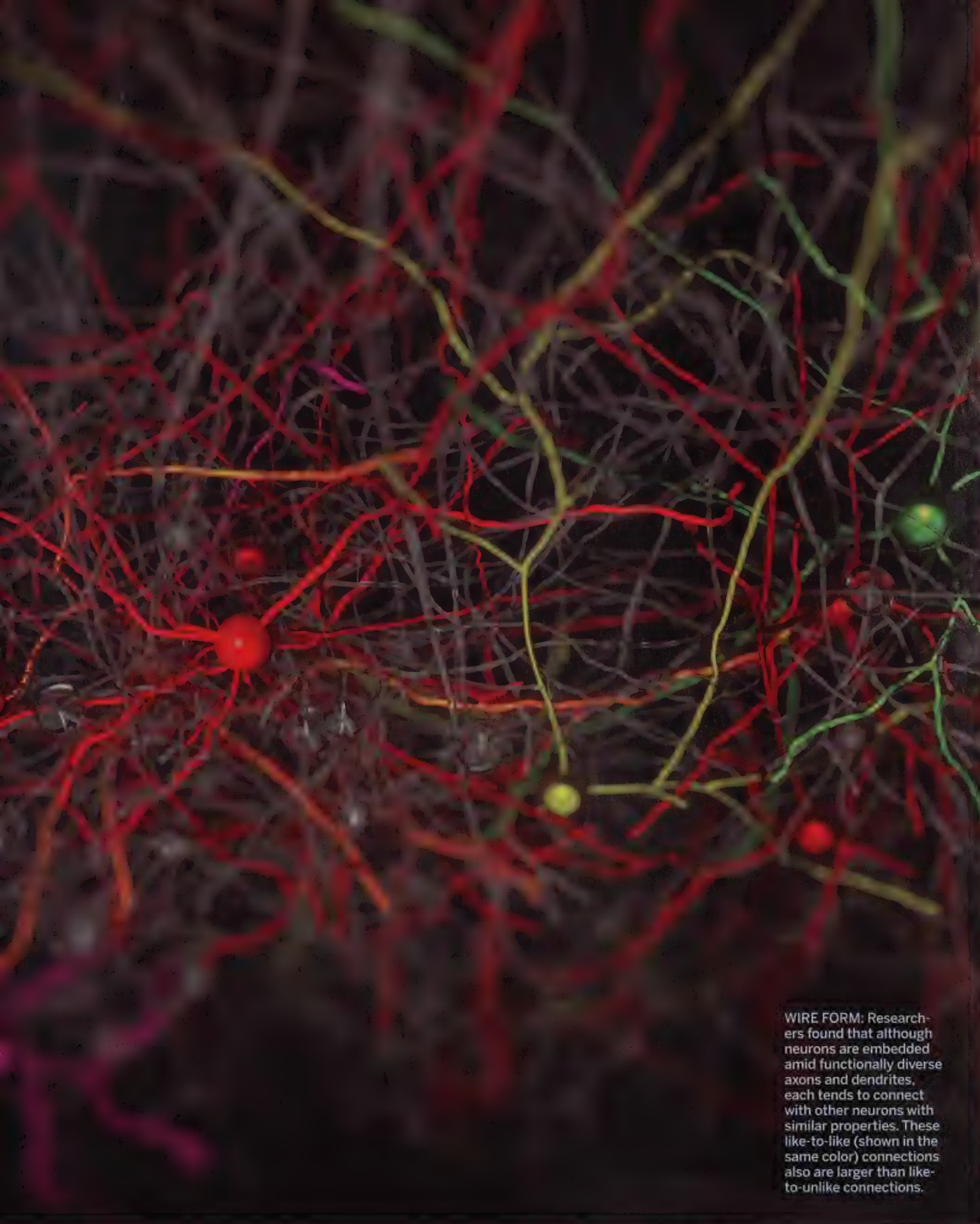
The researchers first used two-photon microscopy to see which neurons in the visual cortex fired as the mice watched various stimuli across twelve days. Then the investigators used an electron microscope they’d modified for high-throughput imaging to track connections among the cells and construct a wiring diagram.

They found that neurons with similar functions, such as recognizing vertical lines, formed more connections with one another than with other neurons, even if those other neurons were close by. Synapses, the junctions where information jumps from one neuron to another, were also larger between functionally related neurons.

According to the researchers, subnetwork connection patterns may amplify relevant sensory signals enough to get through the cortex’s inhibitory filter.

The researchers think the information-processing principles being revealed in mice will apply across other animal species. They hope future work in the field will illuminate how neuronal networks are constructed during development, how they change in response to plasticity, and how they go awry in disease, including proposed “connectopathies” such as schizophrenia and autism.

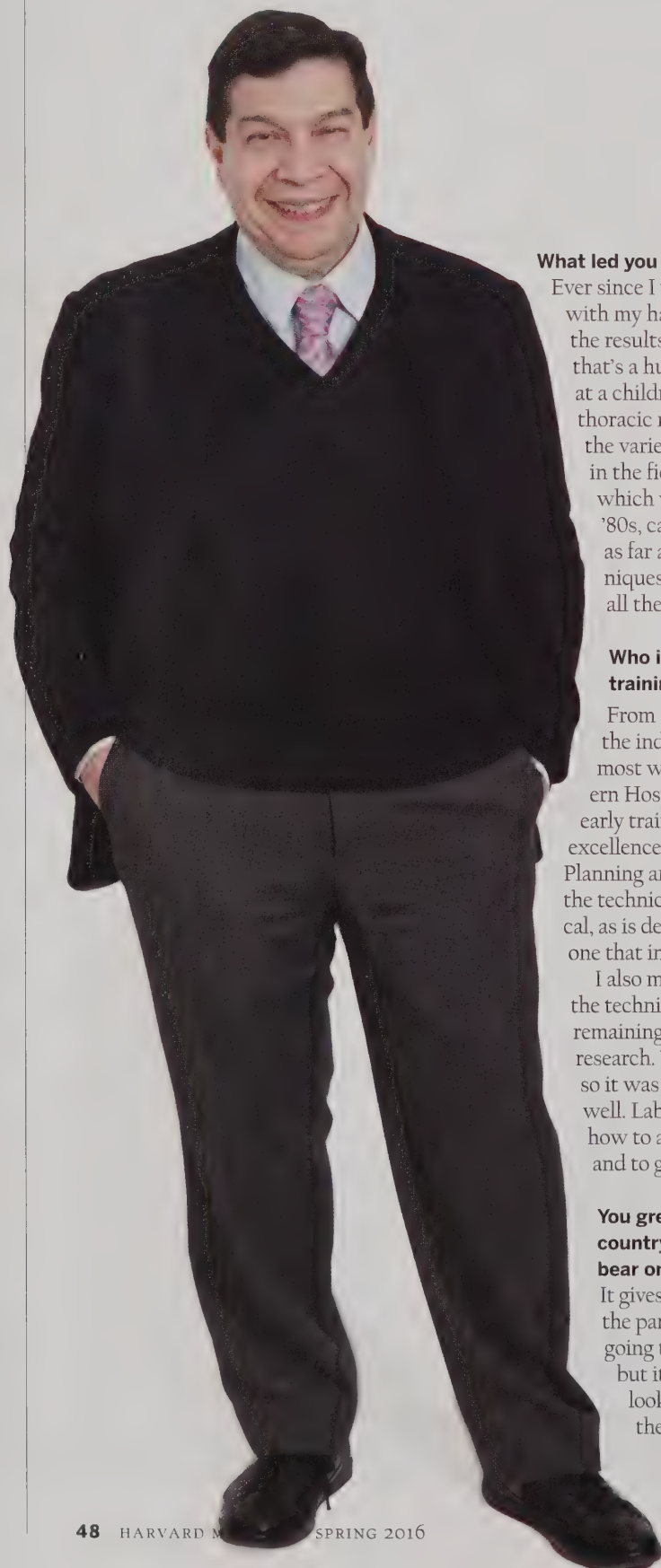
—Stephanie Dutchen



WIRE FORM: Researchers found that although neurons are embedded amid functionally diverse axons and dendrites, each tends to connect with other neurons with similar properties. These like-to-like (shown in the same color) connections also are larger than like-to-unlike connections.

FIVE QUESTIONS

FOR PEDRO DEL NIDO ON HONING ONE'S SURGICAL SKILLS



What led you to specialize in surgery?

Ever since I was a kid, I've liked working with my hands. Surgery allows me to see the results of my work immediately, and that's a huge attraction for me. I worked at a children's hospital during my cardiothoracic residency and was exposed to the variety of problems and challenges in the field. When I was training, which was in the late '70s and early '80s, cardiac surgery was exploding as far as new procedures and techniques, new things being discovered all the time. It was an exciting time.

Who influenced you during your training?

From a surgical standpoint, probably the individual who influenced me the most was Tirone David at the Western Hospital in Toronto. During my early training, he emphasized technical excellence, particularly in cardiac surgery. Planning and analyzing are important, but the technical aspects of the work are critical, as is developing a self-critical nature—one that inspires you to always improve.

I also met people who could focus on the technical aspects of surgery while remaining active in academic laboratory research. To do both things well is hard, so it was instructive to see it managed well. Laboratory research taught me how to ask questions, to be analytical, and to get to the core of a problem.

You grew up an immigrant in this country. How does that experience bear on your clinical work?

It gives me a sense of empathy for what the parents of many of my patients are going through. Empathy is important, but it's not the only thing they're looking for. They come to you for the solution to a problem.

Also, what I had learned during training about constant

**William E. Ladd Professor
of Child Surgery, Boston
Children's Hospital,
Harvard Medical School**

**Chief of Cardiac Surgery,
Boston Children's Hospital**

self-improvement resonated with me: that's how my parents were. I think that lesson has served me well clinically and in research. I try to pass that idea on to those I'm now training—never assume that what you're doing is perfect.

How do you prepare for difficult surgeries?

I try to prepare the parents first. They want to know what the problem is, how you propose to fix it, and what the risks are. I need to provide them with the details and prepare them for unexpected problems.

When I approach a surgery, I often find that the standard solution will not work well for my patient. I start thinking about ways to innovate, to come up with a better solution for that patient. This is where preparation and consulting with other surgeons becomes especially important. Working in Boston, no matter what problem comes through the door, there's somebody who's seen it before and can give you perspective.

What makes a good surgeon?

You have to care about what you're doing. And I think above all, you must want to walk out of the operating room happy with what you've just done. If, however, things didn't go as well as you'd hoped, you need to ask "Why? How can I do it better?" That can take you from being a good surgeon to being a great surgeon.

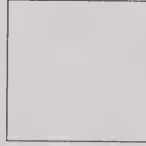
—Susan Karcz



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THE COMMUNITY OF HARVARD MEDICAL SCHOOL ALUMNI

ALUMNI COUNCIL REPORT

At the Winter meeting of the Alumni Council, Dean Flier gave a compelling, passionate, honest, and most welcome report on the School, one that resulted in several Council members reemphasizing the need to “help the dean raise money.”

The Council's efforts to strengthen support for HMS students continue and are now under the leadership of Tamara Fountain '88. Tamara presented the Council with her vision for her role as the new chair of the Alumni Fund. The need to support the fund has never been greater, so Tamara's passion and skill are welcome.

In his update to the Council on the School's educational outreach programs, David Roberts '95, dean for external education, outlined his department's efforts to bring the expertise of HMS faculty to a worldwide audience. Carolyn Walsh '09 reported on the liaison project she's leading for alumni and recent graduates, and Harold Burstein '90, the Council's liaison to the Harvard Alumni Association, presented news on pan-Harvard alumni efforts. To further inform the Council on efforts to bring forward the stories of women at HMS, Julia Haller '80 presented early details of an October event marking contributions by women physicians and researchers at HMS. Council members also learned more about the academic research arm of the School through talks presented by two faculty researchers.



Derek Stenquist

Solid Underpinnings

Albright award recipient eyes career as an orthopedic surgeon

LIFE LESSONS FROM FAMILY and patients and the influence of mentors figure prominently in the making of Derek Stenquist '16 as a physician and aspiring orthopedic surgeon.

Stenquist is the 2016 recipient of the Hollis L. Albright Scholar Award, which is presented annually to an outstanding medical or surgical student at HMS who is dedicated to surgery and patient care—areas in which Albright, a 1931 graduate of HMS and surgeon at Massachusetts General Hospital, excelled.

After college, Stenquist worked at Boston Children's Hospital, where he saw how technology could advance medical training and improve patient care. Later, in Zimbabwe, he

worked with Grassroot Soccer, a nonprofit dedicated to preventing HIV transmission and to improving access to HIV testing and treatment.

Stenquist developed an interest in orthopedic surgery after watching how his father, a carpenter, struggled for twelve years with arthritis-induced pain in his knees before receiving two successful knee replacements.

As a first-year medical student, Stenquist worked in the Dominican Republic with Operation Walk Boston, a nonprofit that performs free joint-replacement surgeries for underserved patients. Working with his mentor, Jeffrey Katz, an HMS professor of medicine at Brigham and Women's Hospital, he found that patients

reported physical and psychological benefits after receiving the surgery. Their work also identified a need for better perioperative education for patients with limited health literacy.

“To fill that need,” says Stenquist, “we developed a Spanish-language patient-education module, which launched in the Dominican Republic this year.”

Stenquist says that he was especially proud to receive an award named in honor of a mentor who was a father because he personally drew so much inspiration for his work in medicine from his own parents.

He attributes his desire for a career in service to his mother, who instilled in her children a tremendous sense of gratitude for their blessings and a desire to give back to those less fortunate. Working with his father taught him how to quickly become proficient in the hands-on skills of carpentry. Throughout his career in orthopedic surgery, Stenquist hopes to reflect his father's work ethic, personal integrity, and dedication to his craft.

“I am so grateful to my parents for the values and life lessons they've taught me,” says Stenquist.

The award Stenquist received was presented during a symposium established by Albright's children, Nile and Tenley '61, to honor the memory of their father who, for more than sixty years, dedicated his life to surgery, patient care, and the students he mentored.

Stenquist is well on his way to following in Albright's footsteps: He has matched to Mass General in the Harvard Combined Orthopaedic Residency Program, a collaboration of HMS and four of its affiliated hospitals in Boston.

—Susan Karcz

CONNECT THE DOCS

THE COMMUNITY OF HARVARD MEDICAL SCHOOL ALUMNI



REFLECTION: Anatomy lab students organized and conducted a memorial service for the anatomical donors whose generosity contributed to the students' medical training.

DEBT OF GRATITUDE

HMS first-year students honor anatomical donors

DISSECTING A HUMAN BODY is a fundamental part of the education of first-year Harvard medical and dental school students. This past fall, students in the Pathways and Harvard-MIT Health Sciences and Technology curricula spent more than sixty hours in the anatomy lab learning from the cadavers of twenty-seven women and twenty-five men.

The fifty-two donors, participants in the Anatomical Gift Program at HMS, had entrusted their bodies to the program so that the students could learn and countless future patients could benefit from the knowledge the students gain. In March, the students acted to recognize the selfless generosity of the donors.

"The donors really invested in our education without knowing us at all. It's something to be grateful for," said Megan Min-Young Jang '19, a student organizer for the Anatomical Donor Memorial Ceremony.

The ceremony provided the students a way to connect with the donors by paying tribute to and honoring them. The program included musical performances, readings, and personal reflections.

Flutist Clara Da Yang '19 played Claude Debussy's *Syrinx* and noted how the piece expressed the emotions she had experienced in the anatomy lab: "surprise, joy, hesitation, sadness, and death."

To honor confidentiality agreements, the students are never given specific information about the donors. But that didn't stop them from wondering about the donors and their lives.

Jessica Stuart '19, for example, read from a short piece she had written. "I wondered what these hands had done. The people they had touched. The rings they had worn."

"I felt the urge to hold them."

At the memorial ceremony, the students had a small opportunity to discover more about the donors as they recited a list of their occupations—an artist, two engineers, an innkeeper, a custodian, four teachers, a waitress, a lawyer, seven homemakers, a registered nurse, and others with careers across a range of fields.

Many expressed gratitude for being given an extraordinary opportunity to learn from the donors.

"Every single body was a person," noted Jang. "And that's really what the donor ceremony is about."

—Bobbie Collins

Nancy Oriol and Ronald Arky



Jobs Well Done

Leadership changes announced for education posts

AS OF JULY 1, several changes will take place in the leadership ranks for medical education at HMS. On that date, Nancy Oriol '79, HMS associate professor of anaesthesia at Beth Israel Deaconess Medical Center, will step down as dean for students. Oriol has mentored HMS students for nineteen years—twelve as dean and seven as associate dean for student affairs. She will next serve as the School's faculty associate dean for community engagement in medical education.

Fidencio Saldaña '01, an HMS assistant professor of medicine at Brigham and Women's Hospital, will succeed Oriol as dean for stu-

dents. Saldaña has served as faculty assistant dean for student affairs in the Office of Recruitment and Multicultural Affairs since 2010 and was a leader in shaping the Pathways curriculum, serving as director of Patient-Doctor II and codirector of the new Practice of Medicine course.

Another familiar longtime presence, Ronald Arky, the Daniel D. Federman, M.D. Distinguished Professor of Medicine and Medical Education at Brigham and Women's, will leave his post as advisory dean and director (formerly known as society master) of the Francis Weld Peabody Society after nearly thirty years of mentoring students. Arky

has contributed to the design of both preclinical and clinical curricula and was instrumental in the creation of the Cambridge Integrated Clerkship and in the development of combined degree programs such as the MD/MBA.

To commemorate his tenure as the last remaining original academic society leader appointed by Dean Tosteson '48 in 1987, Arky is establishing an endowed society advisor position, the Arky Family Associate Director and Advisor of the Francis Weld Peabody Society. Beverly Woo, HMS associate professor of medicine at Brigham and Women's, will be the inaugural incumbent.

Arky will be succeeded as advisory dean and director of the Peabody Society by Bernard Chang, who is an HMS associate professor of neurology at Beth Israel Deaconess, one of the architects of the Pathways curriculum, and a nationally known researcher in epilepsy.

The advisory dean and director of the William Bosworth Castle Society will also be stepping down. Orah Platt '73, an HMS professor of pediatrics and a hematologist at Boston Children's Hospital, has led the Castle Society since 1998. Her work in hematology is reflective of the work of the society's namesake, who made the observation that a factor, dubbed the intrinsic factor, was necessary for the absorption of vitamin B12. Platt's own research focuses on thalassemia and sickle cell disease. She has defined the epidemiology of sickle cell's major complications and has studied the sickle red-cell membrane in an effort to find new therapies.

Jennifer Potter '87, an HMS associate professor of medicine at Beth Israel Deaconess and director of the Women's Health program at Fenway Health, will succeed Platt as advisory dean and director of the Castle Society. —Susan Karcz

CLASS NOTES

NEWS FROM ALUMNI

1945

Giulio D'Angio

My great-grandson, Charles D'Angio White, arrived on December 29, 2015. My wife, Audrey Evans, aged 91.9, developed appendicitis in January and recovered rapidly from laparoscopic surgery. I know, I know—at her age!—but she has always written her own book. A multi-authored history of the International Society of Pediatric Oncology that I am writing and editing is entering its final stages, with publication expected this fall.

1951

Jerome Fischbein

My wife, Elizabeth, and I have

moved to what is called a life plan community in California. Two of our daughters, Margery and Barbara, live outside of California, in Manhattan and Newton, Massachusetts, respectively, while daughter Nancy lives in Palo Alto, where she is a professor of radiology at Stanford. Her husband, Michael Kaplan, is a professor of otolaryngology, also at Stanford.

Our granddaughters Eliana and Jenna attend high school in Palo Alto. Our grandson, Daniel Berenson, is in his third year of the MD-PhD program at Stanford. His sister, Alice, is graduating from Harvard College this year and plans to apply to medical school next year.

Elizabeth and I are actively involved in our new member-owned community, where I

serve as chief financial officer of the health center's board and on the finance and audit committees. Elizabeth serves on the welcome, interior design, and film committees. We are both well and very happy to be living in our new home, a tranquil and beautiful location with an excellent climate all year. If any classmates visit this area, we would be delighted to see you. All the best to the Class of 1951!

1954

Nanette Wenger

As many of you know, my focus for the last several decades has related to research, teaching, patient care, and advocacy on heart disease in women. I was honored as a Woman in Interventional

Cardiology Luminary in May at the 2016 annual meeting of the Society for Cardiovascular Angiography and Interventions.

1957 60th REUNION

Sidney Alexander

I am nearing the finish of my fifty-third year in the cardiology department at Lahey Hospital and Medical Center and continue to have a busy clinical practice. About a third of my time is spent teaching residents and cardiology fellows. I will continue as long as I enjoy the work and my brain and body allow. I recently was deeply honored by the establishment of the Sidney Alexander Chair in Cardiology, occupied by the chief of cardiology here who will disperse the funds for education and



research. I look forward to our 60th reunion next year.

1960

Sirgay Sanger

Over the years I have been involved in many pro bono activities, such as heading the National Council on Problem Gambling, based in Washington, D.C., and serving as chairman of the Venice, Italy, office of the World Monuments Fund. During my tenure we completed the restoration of the Santa Maria della Pietà, also known as Vivaldi's church, and the Schola Canton synagogue, both in Venice.

My wife, Judy, and I continue to try to make a difference with the New York Festival of Song, the Lincoln Center Theater, and the Shaw Festival in Ontario. I continue to maintain my full-time practice in infant, child, and adolescent psychiatry.

1964

Douglas Zipes

My third novel, *Not Just a Game*, has just been published. I hope you enjoy it.

1967 50th REUNION

Thomas Gutheil

I was disappointed to see NO notes from my class and few from other classes in the last issue of *Harvard Medicine*, so I bestirred myself to send one in. I'm still kicking; writing and reviewing cases as an expert witness. My latest book, published in October, is *The Expert Expert Witness*.

However, I am taking a big step that I thought I would share with classmates: I am going to stop donating to Harvard College. I feel that an unprecedented level of anti-Semitism, sometimes thinly disguised as anti-Israel, is not only being tolerated at the administrative level of the college by both students and faculty without challenge or disciplinary response, but is also being perpetrated without challenge by some faculty, whose mission is supposedly truth (*veritas*, remember?). In my view, the issue goes beyond free speech and Islamophobia and extends to myths and lies. I see no value in giving money to support such a situation.

Others may wish to follow my lead; I am interested in my classmates' views on this concern.

1968

James Burdick

I recently published *Talking About Single Payer: Health Care Equality for America*, in which I address the near absence of realistic attention to a single-payer system in the United States this election year. Although our country has seen improvements from Obamacare, it is apparent that our health care system continues to fail our citizens. My hope in publishing this book is to call for a strong new vision for a national program and to establish an innovative plan.

On the family front, my wife, Mary, and I are fine in St. Michaels, Maryland, occasionally traveling for pleasure and to visit family. In addition, I am enjoying semiretirement.

1969

Leonard Kaban

After thirty-two years, ten at the University of California, San Francisco, and twenty-two at Massachusetts General Hospital, I have finally relieved myself of my administrative burden, stepping down as department chair at Harvard School of Dental Medicine and as chief of oral and maxillofacial surgery at Mass General. I continue my research and patient care activities but have much more time to pursue my personal interests and to spend time with my children and grandchildren. So far, I am enjoying this new phase of life.

1976

Laurie Glimcher

In February, I was named president and CEO of the Dana-Farber Cancer Institute. It is an honor and privilege to be chosen as the next leader of Dana-Farber. I look forward to returning home to Boston and to HMS, where I will be also working as a professor of medicine.

1977 40th REUNION

Paul Shellito

I am happy to have a stable and satisfying personal and professional life. I continue to work in the Department of Surgery at Massachusetts General Hospital as a colorectal surgeon. It's a great place to be, and I can still see myself as an HMS student when I meet the newbies coming through each year!

I have now semiretired by transitioning my practice from

surgery and endoscopy to endoscopy only. I miss the surgery, but the stress level has dropped dramatically, which has been great.

All is well with my family. My wife, Barbara, teaches English at Wayland High School. My son John is in his first job as an Episcopal priest at a church in Arlington, Virginia, and my son Peter is a geology graduate student in Boulder, Colorado. I miss them every day. Our leisure time is often centered around our lake house in Center Harbor, New Hampshire, with snowshoeing in winter and hiking, swimming, and canoeing in summer. I love New England, and would love to stay right here when I retire.

It seems not long ago at all that we were in Amphitheatre C together, and I am grateful for the relationships I formed with you all at HMS. Here's hoping that we have many good years ahead of us.

1981

Ignacio Antonio (Tony) Magana

I am currently professor in neurosurgery at Ayder Referral Hospital and Mekelle University School of Medicine in Mekelle, Ethiopia. I am involved in medical student and surgical resident education and have an active academic practice in adult and pediatric neurosurgery. I have also started a multidisciplinary research team on the high levels—more than 60 per 1,000 births—of neural-tube defects.

Michael Payne

I'm currently working as a gastroenterologist at Cambridge Health Alliance. I'm also running for the Harvard Alumni Associa-



tion Board of Elected Officials. Please vote if you haven't done so already! And please also vote in the Harvard Board of Overseers election. There is a slate of write-in candidates who, in my opinion, do not have the best interests of the University (or students) at heart. Please vote for the regular candidates!

1983

Barbara Leone

After twenty-seven years of practice in underserved communities, including twenty-three teaching in two family medicine residencies, I went into semiretirement in October 2013. I now work doing acute care in a walk-in clinic, three shifts a week for the HealthEast Care System in Minnesota, the same hospital system where I did my residency. My husband of eleven years, Steve Brown, and I are parents of four grown children. Tatiana is now 44, married, and has two children ages 6 and 17; Erik is 45; Sunkeria

37; and Jasmine 26. We have nine grandchildren together.

We have spent the past two Januarys in South Padre Island, Texas, one of the benefits of semiretirement. Last August, Steve and I went on an Alaskan cruise to celebrate my sixty-fifth birthday. In September, Steve was diagnosed with pancreatic cancer. He's gone through six months of chemo and had Whipple surgery in May. Our hope and encouragement is in the Lord.

1985

David Benaron

I've taken a position as chief medical officer of Jawbone, a San Francisco-based "unicorn" startup, now pivoting from wearable fitness bands to wearable medical wellness bands. My last startup, in noninvasive monitoring, was acquired in September. Being part of this transition, I feel I have the best job in the world.

Michael Schwarzschild

I am leading a North American clinical research consortium conducting clinical trials for people with Parkinson's disease. My colleagues and I are excited to be starting a trial of a urate-elevating treatment aimed at slowing progression of the disease. If you know anyone with early Parkinson's who does not yet require standard dopaminergic treatment, please consider referring him or her to the SURE-PD3 trial. Eligibility can be gauged at the SURE-PD3 entry of ClinicalTrials.gov, which will be listing the sixty participating clinical centers across the United States.

1987 30th REUNION

Ray Price

I recently became associate director of the Center for Global Surgery at the University of Utah, where we are working on setting up satellite sites to study and find solutions to improve access

to affordable quality surgical care worldwide, with satellite campuses in Ghana, Mongolia, and Korea. I am currently working on organizational and educational development along with funding initiatives. We hope to test the Xenoscope (a \$40 high-definition laparoscope/camera/light source) in India. The tool was developed through our extreme affordability program at the university.

1991

Ming Wang

This year marks the twenty-fifth year since we graduated from HMS—how time has passed! I've been enjoying my private practice at Wang Vision 3D Cataract and LASIK Center here in Nashville, Tennessee. I also have a business in China as the international president of Shanghai Aier Eye Hospital, the largest private eye hospital group in China. I am still doing competitive ballroom dancing and playing my *erhu*, the Chinese violin.

Share Your News

If you have updates you'd like to share in Class Notes, you can submit them easily and securely to classnotes@hms.harvard.edu. Be sure to include your full name and class year.

OBITUARIES

REMEMBERING DISTINGUISHED LIVES

1930s

1937

Waldron M. Sennott
March 3, 2016

1940s

1943

James P. Dixon, Jr.
February 27, 2016

Jack Vernon Knight
March 9, 2016

Harold F. Searles
November 18, 2015

David M. Sensenig
January 31, 2016

1946

James Metcalfe
January 8, 2016

1947

Robert W. Hopkins
February 22, 2016

1948

John E. Connolly
February 20, 2016

Dean M. Dolison
March 9, 2016

R. Ralph Margulis
January 23, 2016

1949

Melvin Horwitz
March 5, 2016

Murry D. Schonfeld
February 14, 2016

1950s

1951

William G. Manson
January 20, 2016

1952

David K. Clawson
March 11, 2016

1953

Geoffrey M. Coley
March 30, 2016

1954

Nathan P. Couch
April 14, 2016

1955

Howard J. Geist
March 21, 2016

1956

Arnold M. Katz
January 25, 2016

James H. Ryan
December 28, 2015

1957

Brack Davis
March 14, 2016

1958

James W. Hall III
March 25, 2016

1959

Richard E. Boden
March 2, 2016

John Urquhart III
March 19, 2016

1960s

1961

Howard F. Carpenter, Jr.
January 16, 2016

1962

Anita P. Vance
March 28, 2016

1963

Ralph A. Epstein
February 7, 2016

1968

Edward R. Sun
April 3, 2016

1969

Lewis M. Bobroff
February 20, 2016

1970s

1974

David R. Mauritson
February 1, 2016

1978

Michael H. Munoz
January 19, 2016

This listing of deceased alumni includes those alumni whose notices of death were received between January 23 and April 22, 2016. Links to full obituaries of these alumni can be found at hms.harvard.edu/memoriam.

If you know of an HMS alumna/us who has died recently, please email the link to the obituary to hmsalum@hms.harvard.edu.

TAKING A HISTORY

PROFILE OF ANTHONY PATTON, CLASS OF 1958



CLAIM TO FAME

Chief of Thoracic and Vascular Surgery at Salem Hospital, retired; past president of the Boston Surgical Society; founder and president of the North Shore Planning Council; founder of the thoracic and vascular unit at

Salem Hospital; co-founder of North Shore Hospice, Inc.

PERSONAL FORTUNES

"My mother didn't want me to be a doctor," says Anthony Patton. "She was always suspicious of people who made their lives from other people's bad fortune."

Patton may not have heeded his mother's words in this one instance, but he readily admits his appreciation of their wisdom.

"Her words sharpened my awareness of the emotional and financial toll that illness takes on patients and their families," he says.

TEAM SPIRIT

Patton attended Harvard College, where he was a member of the hockey team. His involvement in this sport has an unexpected influence on his decision to become a surgeon.

During one game, Patton broke his collarbone. The injury sent him to Massachusetts General Hospital, under the care of Earle Wilkins and Frank Wheelock, then young surgeons who covered the Harvard athletic teams. The quality of their care impressed Patton. "They were empathetic, positive, and cheerful," he says. "They both seemed to be enjoying their work greatly."

ROUND TRIP

Patton's life as a physician has been filled with exceptional experiences. One such experience, he says, involved a year abroad to specialize in general thoracic surgery. In 1963, having almost finished his five

years of surgical residency at Mass General, Patton; his wife, Chris; and their three young children sailed to Devon, England. There, Patton worked as a surgical assistant to Jack Griffiths, a thoracic surgeon whose unit was one of only fifty in the British Health System. The experience was transformative, says Patton, for it offered him a large number of operative cases as well as clinical experience.

LESSON PLAN

Patton retired from surgery in 1996, but his passion for learning and medical education has endured. After years of teaching residents at Salem Hospital, he became an instructor in surgery at HMS. For a little more than a decade, he worked with first- and second-year students to improve their early clinical skills and reviewed the work of third-year students on the wards. To all his students he emphasized the importance of "honing your technical abilities to the absolute best." His lessons also reached beyond those necessary in the operating theater: respect the people you work with, remain empathetic to patients' issues and emotions, and ask for help from fellow surgeons.

"There is always much one can do to ease suffering," Patton says. "A doctor has a responsibility to remember to be a teacher and an advocate for the patient and the patient's family."

"I still consider it an honor to be a doctor," adds Patton. "Surgery was the way I chose to fulfill my responsibilities as a physician. But to be the best physician possible was always my first priority."

—Sara Silvestro



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A the in

